Impact of Manning and Infrastructure Initiatives on the Surface Navy

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Contents

Executive summary

In recent years, the Surface Navy has experienced many changes that have affected manning on ships and training and maintenance infrastructure support to the ships and personnel aboard them. Most of these changes have been efficiency initiatives that have reduced available resources.

Manning initiatives have included the following:

- Optimal manning
- FFG-7 billet reductions
- Pay and Personnel Ashore (PAPA) detachments
- Top 6 alignment
- Individual augmentees.

Initiatives involving maintenance and training infrastructure have included the following:

- Consolidation of Shore Intermediate Maintenance Activities (SIMAs) in Regional Maintenance Centers (RMCs)
- The Revolution in Training and the introduction of computer-based training
- Downsizing of Afloat Training Groups (ATGs)
- Disestablishment of Aegis Training Readiness Center (ATRC).

Surface Navy leadership is concerned that the cumulative effect of all of these initiatives is having a negative effect on ship readiness. COMNAVSURFOR asked CNA to investigate the cumulative impact of the initiatives on surface ship readiness to see if empirical evidence supports (or does not support) expert judgment and anecdotal observations of a decline in surface ship readiness.

We started by analyzing each initiative, identifying the objectives, and comparing planned versus actual implementation. We observed the following:

- Substantial surface ship manning reductions in the past 7 years
  - — Largest reductions for DDGs (23 percent less than 2002 manning)
  - — Mostly in lower paygrades
  - — Navy Enlisted Classification (NEC) manning unchanged by optimal manning—at 65 to 70 percent—though there have been increases in the last 18 months
  - — Top 6 alignment has lowered seniority aboard ships, especially amphibious ships.
  - — PAPA detachment timeliness has been poor
  - — Individual augmentees have grown substantially in the past 5 years and are currently about 1 percent of enlisted manning
- Numerous changes to the training and support infrastructure
  - — The Revolution in Training has brought many changes to Navy training, but there is no evidence of an adverse impact from schoolhouse computer-based training
  - — Afloat training may be adversely affected by lack of access to computers/internet and by availability of OJT supervisors
  - — The SIMA/RMC manning drawdown has led to less opportunity for in-rating shore duty for maintenance ratings
  - — There has been a gradual decline in ATG manning, with ATG staff feeling that they have less ability to respond to tasking.

We also analyzed trends in surface ship readiness from before implementation of the above initiatives until the present. We observed the following:

- The organizational workload has increased.
- The Current Ship's Maintenance Project (CSMP) backlog has increased, mostly in ship's force low-priority tasks.
- Inspection and Survey (INSURV) results show no trends, though 2008 Cruiser-Destroyer (CRUDES) failures are cause for concern.
- Casualty Reports (CASREPs) have increased.
- Air defense exercise metrics have declined.
- Status of Resources and Training System (SORTS) data do not show a decline in readiness.

We looked for cause-and-effect relationships between the initiatives and readiness trends and found significant indications of such relationships. For example, the decline in CRUDES (CG/DDG/FFG) manning is highly correlated with the increase in open C2 CASREPs. However, manning declined at the same time as infrastructure reductions, so more detailed analysis, considering the effect of all initiatives, is needed to isolate effects of individual initiatives

Overall, there is some evidence that a cumulative effect of the resource reductions has been a decline in ship readiness. These trends should be monitored and further analyzed.

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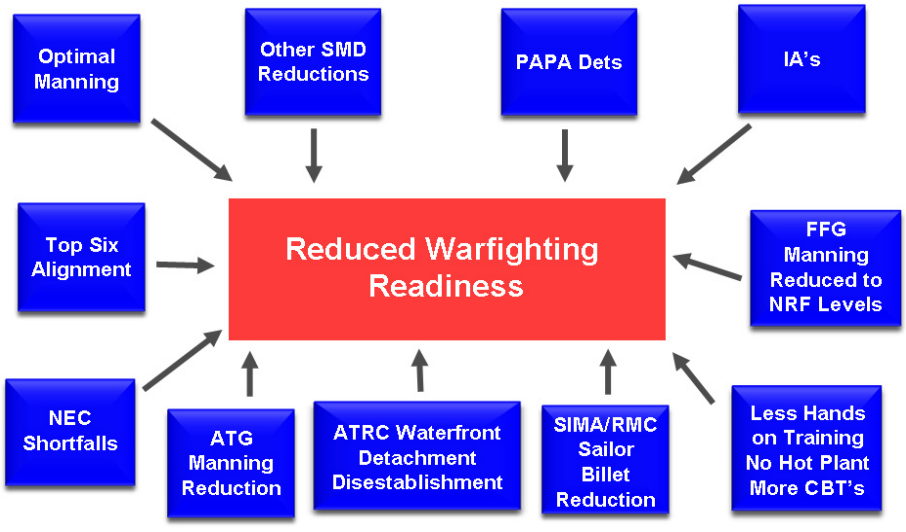
Introduction

The Surface Navy has experienced many changes in recent years. Changes have affected manning on ships as well as training and maintenance infrastructure support to the ships and personnel aboard them. Most of these changes have been efficiency initiatives that have reduced available resources.

Surface Navy leadership is concerned that the cumulative effect of all of these initiatives is having a negative effect on ship readiness. In November 2008, RADM Quinn (Deputy COMNAVSURFOR) articulated these concerns in a briefing called "Taking a Fix" [1]. This briefing was given to the CNO and alerted Navy leadership to problems in the Surface Navy. Reference [1] summarizes concerns in the following diagram (figure 1).

Figure 1. "Taking a Fix" waterfront perspective



COMNAVSURFOR tasked CNA to investigate the cumulative impact on surface ship readiness of all of the initiatives shown in figure 1 and to look for empirical evidence that supports (or does not support) expert judgment and anecdotal observations of a decline in surface ship readiness.

The study proceeds in two major phases:

1. Analysis of each initiative from the 'Taking a Fix" brief, identifying the initiative objectives and comparing planned versus actual implementation
2. Analysis of trends in surface ship readiness from before implementation of the above initiatives until the present.

We conclude the report by searching for cause-and-effect relationships between the initiatives and readiness.

Manning initiatives

Numerous initiatives have affected ship manning in this decade. We first consider the background, objectives, and introduction of each initiative; then we analyze their cumulative impact.

Optimal manning

In 1999, the Surface Warfare Training Strategy [2] introduced the concept of optimal manning and described it as follows:

> Optimal manning is defined as just the right number of personnel assigned duties to perform all the missions for which the ship is designed, no more and no less. Optimal manning is not minimum manning, in that the ship is designed and constructed from the keel up around the crew to perform its intended function. Optimal training is defined as the Sailor arriving aboard having received just the right amount of training that allows him or her to step in to the job as soon as possible to minimize turnover time and over-tasking of other crew members while the Sailor learns his or her job. Optimal manning demands optimal training.
>
> ...Crew size should be limited to only essential billets. Once optimal manning is achieved, manpower, distribution and training systems must ensure all billets remain filled with properly trained crewmembers.
>
> ...The following actions are required for proper execution of the Surface Warfare Training Strategy: Director of Surface Warfare Division (N86) coordinating with other Chief of Naval Operations codes to promote this strategy and in particular with:
>
> > a. Deputy Chief of Naval Operations (Manpower and Personnel) (N1) to ensure manpower accounts are fully funded and the distribution system improved such that all ships are properly manned at all times. This implies that optimally manned ships will be manned at 100 percent throughout their operational cycle.

b. Deputy Chief of Naval Operations (Logistics) (N4) to ensure infrastructure investment decisions are made that will guarantee compatibility, interoperability and supportability of both new and legacy ships.

c. Director, Space, Information Warfare, Command and Control (N6) to ensure coordinated development of C4I systems that support distance supported learning and training.

d. Director of Naval Training (N7) to improve and better tailor initial training ashore and support initiatives in onboard, embedded and distance supported training technologies that will enhance onboard OJT and continuing training.

The Navy started a test of optimal manning in 2001. The following ground rules were established at the June 2001 Optimal Manning Conference [3]:

- Maintain mission capability in accordance with Required Operational Capability / Projected Operational Environment (ROC / POE).
- Add no risk to ship's safety.
- Make no reduction in ship capability.
- Maintain advances in quality of life / quality of service.
- Consider policy, procedure, and equipment changes in matching manpower to requirements.

Two experiments were initiated in 2001:

- Fleet Manning Experiment (LANTFLT)—units of the *George Washington* Battle Group
- Optimal Manning Experiment (PACFLT)—USS *Milius* (DDG-69), USS *Mobile Bay* (CG-53), and USS *Boxer* (LHD 4).

The most extensive experiment was conducted on USS *Milius*, a Flight I DDG-51 class ship. The *Milius* crew was encouraged to submit suggestions to streamline every facet of shipboard life: watchstanding, maintenance and preservation, training, and ship and crew support

functions, including administrative and crew services. Most of the suggestions were low-cost changes in the categories of policy, procedure, and technology. Many were implemented during the experiment—from June 2001 to October 2002. USS *Milius* demonstrated satisfactory operational capability with a crew of only 235 enlisted members. The results of this experiment are documented in a variety of messages and reports that provide details of the individual changes, assumptions, and effects [4].

Following the experiment with USS *Milius*, optimal manning was implemented in stages (from 2002 to 2006) for several ship classes:

- CG-47
- DDG-51
- FFG-7
- LHD
- LSD-41 and LSD-47.

FFG-7 billet reductions

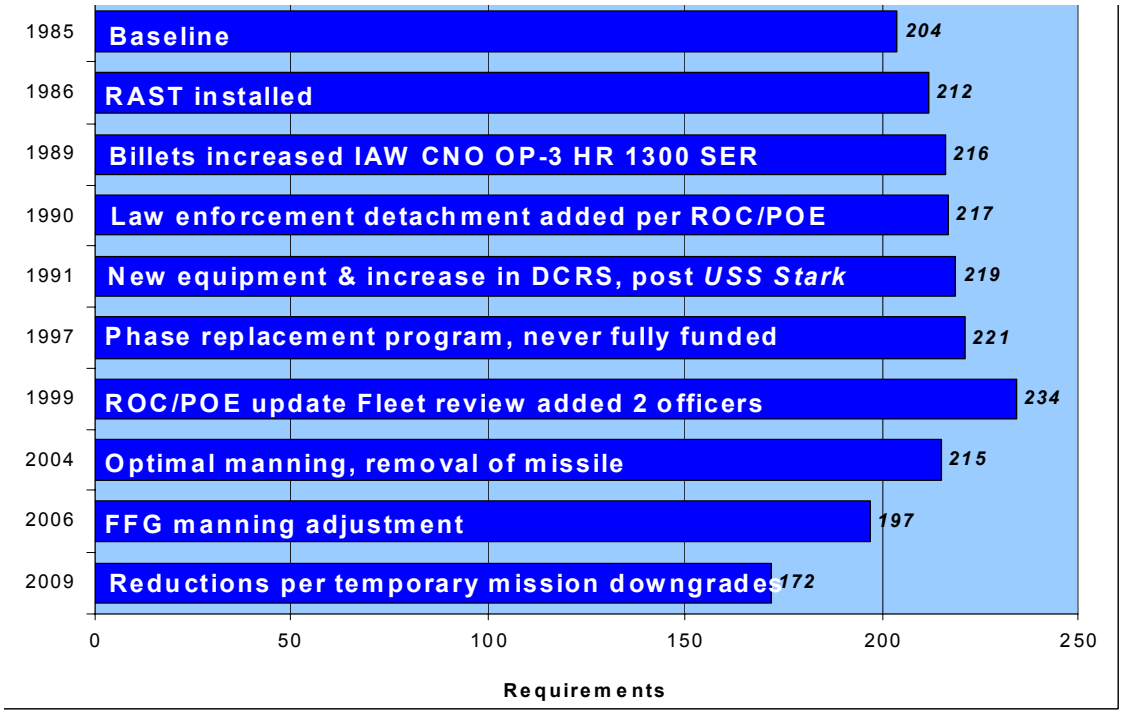
The FFG-7 class of frigates has experienced many changes in mission, equipment, and manpower requirements during the past 25 years. A report from Commodore Glenn Zeiders (FFG Classron) [5] provides many details; figure 2 presents a summary of the changes.

During the past 4 years, the Navy temporarily reduced the missions of all FFG-7s to those of Naval Reserve Force (NRF) frigates. This led to a reduction in billet requirements. However, operational commanders expressed concern at these reduced capabilities, which has led to reconsideration of the missions and manpower reductions. A recent USFF briefing [6] provides details, which are summarized below:

- October 2003—ROC/POE complete
  - — Requirements for 17 officers and 198 enlisted personnel
- November 2006—POM-08 decision to remove reserves and level all units to 14 officers and 173 enlisted personnel

- ROC/POE review completed—document not signed
  - — Changes downgraded antisurface warfare/antisubmarine warfare/C2 warfare (ASU/ASW/C2W) capabilities from primary to secondary, and O-level maintenance requires assist from Fleet Maintenance Activities
- 4 April 2009—Draft Ship Manning Document (SMD) suspended by Navy Manpower Analysis Center (NAVMAC) until ROC/POE issues resolved
- 22 April 2009—Second ROC/POE review completed
  - — Requirements for 17 officers and 192 enlisted personnel
  - — Changes maintain ASU/ASW/C2W capabilities as primary and reevaluate watches
- May 2009—ROC/POE ready for signature.

Figure 2. FFG-7 mission, equipment, and manpower changes



An increase in authorizations to meet the current requirements has not been authorized.

PAPA detachments

The objective of the Pay and Personnel Ashore (PAPA) initiative—part of the Afloat Supply Department of the Future (ASDOF) program—was to realize efficiencies and improve quality of service by consolidating functions ashore. The PAPA Detachment initiative had the effect of moving two-thirds of personnel specialist (PS) billets ashore. The program began with a three-ship experiment in 2001. Fleetwide implementation started in 2003 and concluded by 2007. Aircraft carriers, with the exception of USS *Nimitz*, were excluded.

We summarize the business case analysis for PAPA detachments given in [7]. Commander, Naval Supply Systems Command introduced ASDOF to reduce workload afloat and move it ashore whenever possible. The concept of moving pay and personnel ashore was driven by several factors, including saving money and the optimal manning initiative. PAPA offered the potential to reduce manning on legacy ships and future Navy ships. Manning on future ships was expected to be greatly reduced, requiring more personnel support functions to be accomplished ashore. Anticipated benefits of PAPA included:

- Reduced disbursing/personnel footprint afloat
- Dedicated customer service by the shore detachment
- Improved pay accuracy
- Faster turnaround time on travel claims
- Real-time access to the Defense Finance and Accounting Service (DFAS) and tools.

The business case analysis provided the following data regarding personnel reductions and savings:

- Implementation to occur during FY 2003 to FY 2007
- 165 ships to have personnel reductions
- A total of 2,313 DK/PN reductions
- A total of 1,517 civilian substitutions ashore

- Net present value of anticipated savings expected to be $427 million by FY 2011.

Table 1 summarizes the effect of the PAPA Detachment initiative (BA = billets authorized, and COB = current personnel on board).

Table 1. Ship manpower reductions due to PAPA detachments

Ship class averages		Sep 2003	March 2009	Delta
CG-447	BA	6	2	-4
	COB	7	2	-5
DDG Flights I & II	BA	5	2	-3
	COB	6	2	-4
FFG-7	BA	3	2	-1
	COB	3	2	-1
LSD-41/49	BA	5	2	-3
	COB	6	2	-4
LHD	BA	34	11	-23
	COB	37	9	-28

Top 6 Roll Down

During the past 10 years, the paygrade distribution of personnel has been consistently less senior than the authorized billets. The primary cause has been fiscal: Military Personnel, Navy (MPN) appropriations have not been sufficient to pay for authorized billets. In 2007, the Navy took action to align the discrepancy by selectively decreasing billet paygrades. A primary metric of paygrade seniority is the Top 6 percentage—that is, the percentage of billets in paygrades E4 to E9. This initiative has been called the Top 6 Roll Down. Two briefings by CDR Schauppner (N122X) [8] and [9] provide detailed descriptions of the initiative and note that Chief of Naval Personnel (CNP) guidance for the Top 6 Roll Down has been as follows:

> Develop an enlisted billet base that maximizes Fleet **readiness** while remaining **affordable** and **sustainable**, where
>
> • **Fleet readiness** is the ability to man sea duty and front line operational units to billet requirements

• **Affordability** is ability to pay for the seniority of the work force required to man 100% of the billet requirements at each paygrade

• **Community sustainability** is the ability to grow the work force to the seniority level defined by billet requirements.

The Top 6 alignment required adjusting the paygrade of about 25,000 billets (or increasing the MPN account by $300 million). Implementation is occurring in two phases. A little over 17,000 billets were "rolled down" in phase I and completed for the Spring 2007 EPA (enlisted programmed authorizations). Approximately 8,000 billets are to be rolled down in phase II, which is ongoing.

The impact of Top 6 alignment on the Surface Warfare Enterprise (SWE) has been that 4,768 billets were downgraded in phase I and 407 billets are due to be downgraded in phase II. SWE leadership is concerned about the impact of the Top 6 Roll Down on the seniority of critical SWE billets and, following a recent SWE Manpower Summit, is considering possible alternatives [10]. Figure 3 (from [9]) provides an overview of the imbalance in Top 6 alignment between billets and inventories.

Figure 3. Overview of Top 6 misalignment

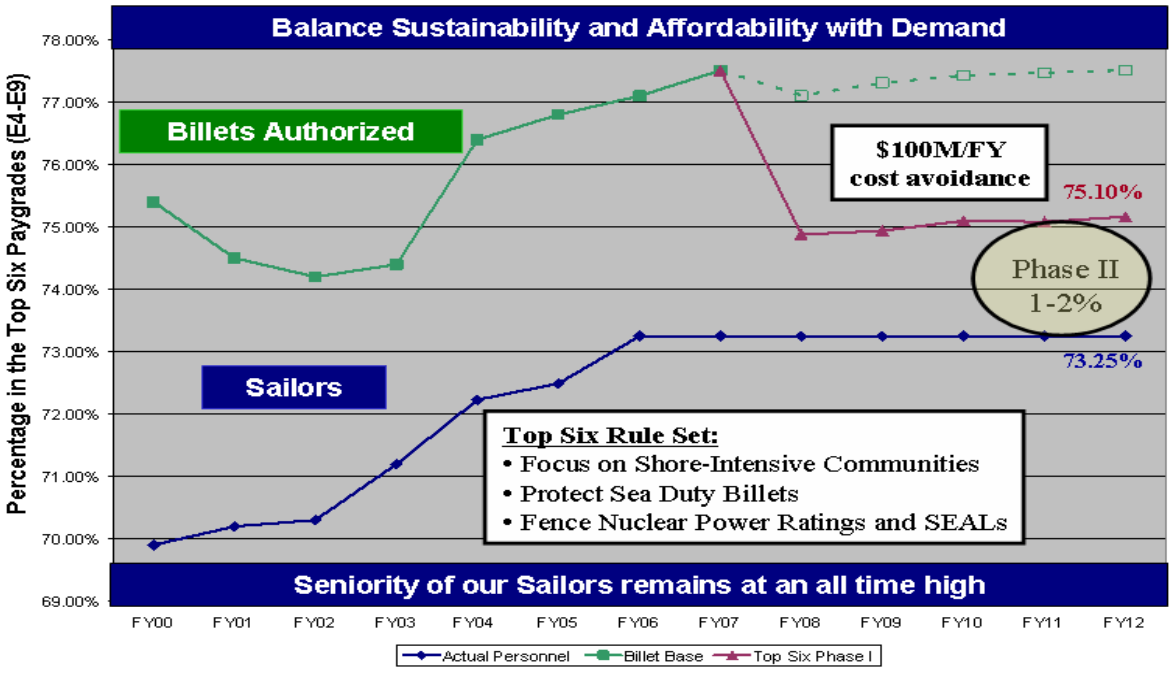


Table 2 displays the effect of Top 6 Roll Down phase I on surface ship classes. Amphibious ships felt the largest impact in the Surface Navy.

Table 2. Impact of Top 6 alignment phase I on Surface Navy

Top 6 %		2006	2009	Delta
CG-47	COB	75.4%	74.2%	-1.2%
	BA	78.8%	76.5%	-2.3%
DDG-51 Flight 1	COB	76.5%	76.1%	-0.4%
	BA	83.7%	81.8%	-1.9%
DDG-51 Flight 2	COB	78.2%	75.9%	-2.3%
	BA	84.2%	83.1%	-1.1%
FFG-7	COB	70.7%	70.6%	-0.1%
	BA	75.5%	74.6%	-0.9%
LSD	COB	64.5%	59.7%	-4.8%
	BA	65.9%	59.0%	-6.9%
LHD	COB	65.9%	61.8%	-4.1%
	BA	68.5%	58.6%	-9.9%

The impact of Top 6 alignment on inventories is not easily measured. At a macro level, it is a billet adjustment that brings the billet structure into alignment with what the Navy can afford to execute. At an individual billet level, there are concerns that the effect of rolling down paygrades may lead to undesirable consequences. For example, an E6 billet rolled down to an E5 billet might be filled by an E4, given one-up/one-down detailing rules. Detailed unit manning analysis, beyond the scope of this study, is required to ascertain the reality of such concerns.

Cumulative impact on ship manning

We now describe the cumulative impact of the various manning initiatives on shipboard manning. The data address the numbers of personnel who have ships as their permanent duty station. They do not take into account the personnel who are not on board (personnel on temporary duty to another location, limited duty personnel, etc.). In particular, the data do not take individual augmentees (IAs) into

account; we address the impact of IAs on the Surface Navy later. We restrict attention to enlisted personnel because that has been the primary focus of various manpower initiatives.

Overall manning

We start by showing the overall change in ship manning that has occurred during the past 7 years. Table 3 displays pertinent data.

Table 3. Ship enlisted manning changes between 2002 and 2009[a]

Ship Class Average	FY 2002			March 2009			Total ** Reductions
	SMD	BA	COB	SMD	BA	COB	
DDG Flight I	324	289	303	247	248	241	21%
DDG Flight II	337	308	323	256	253	248	23%
CG - Non SS	336	341	358	310	295	294	18%
CG Smart Ship	316	326	351	297	295	295	16%
FFG	217	194	204	198	172	175	14%
LSD-41	323	292	306	302	280	285	7%
LSD-49	320	290	295	302	276	276	6%
LHD	1145	1097	1127	1006	985	985	13%

a. ** Total reductions is change from FY2002 COB to Mar 2009 COB.

We observe that all ship classes have experienced significant manning reductions in the past 8 years, the DDG-51 destroyer class has experienced the largest reductions, and current manning is roughly 25 percent less than 2002 requirements.

The manning reductions have occurred gradually, and onboard inventory reductions have lagged behind billet cuts. This is because personnel do not leave immediately following a billet cut, Instead, they remain on board until their rotation date (PRD), when they leave and are not replaced. Consequently, the full impact of the manning cuts was not felt until 2008. Figures 4 through 10 display how billets and manning have declined on individual ship classes.

Figure 4. CG Smart Ship manpower and manning trends

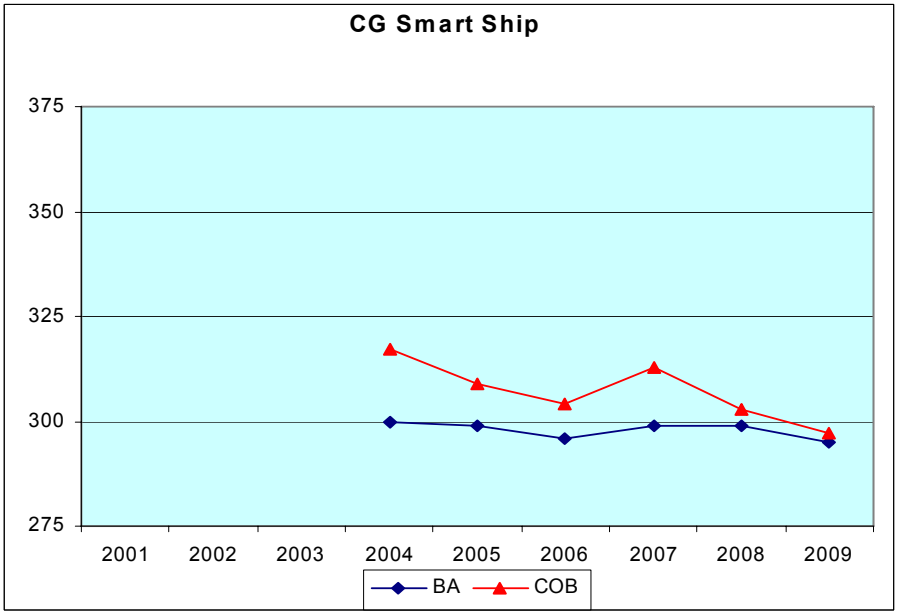


Figure 5. CG Non Smart Ship manpower and manning trends

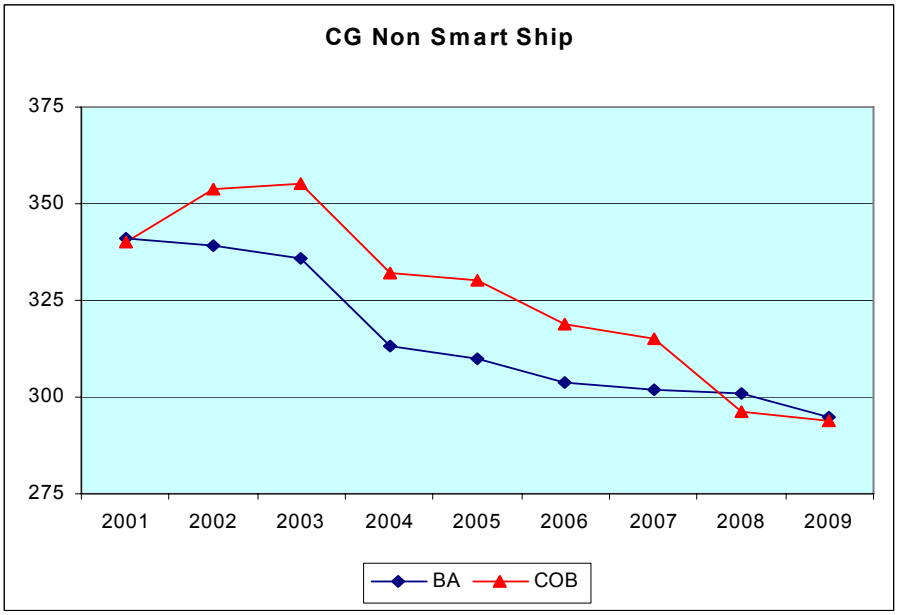


Figure 6. DDG Flight I manpower and manning trends

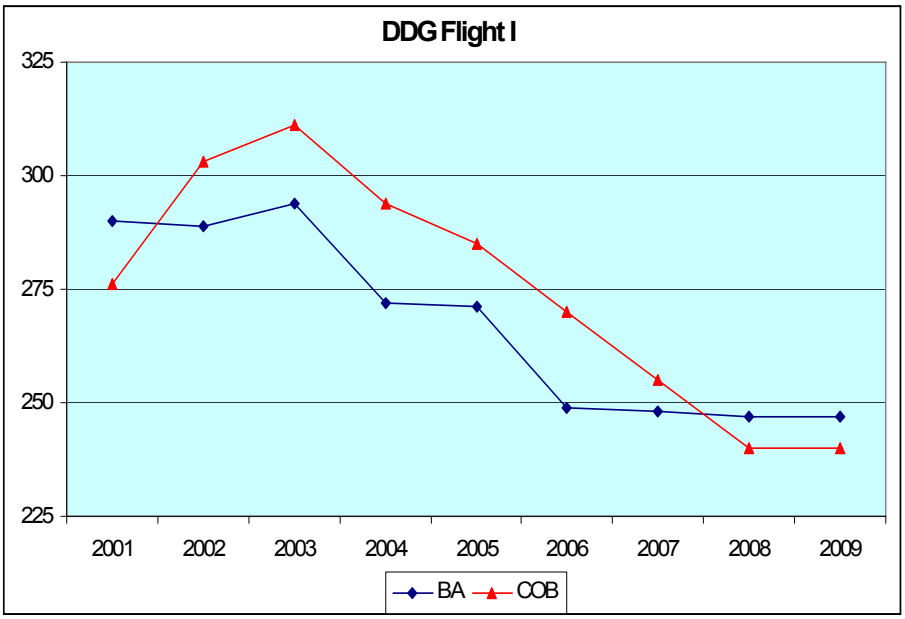


Figure 7. DDG Flight II manpower and manning trends

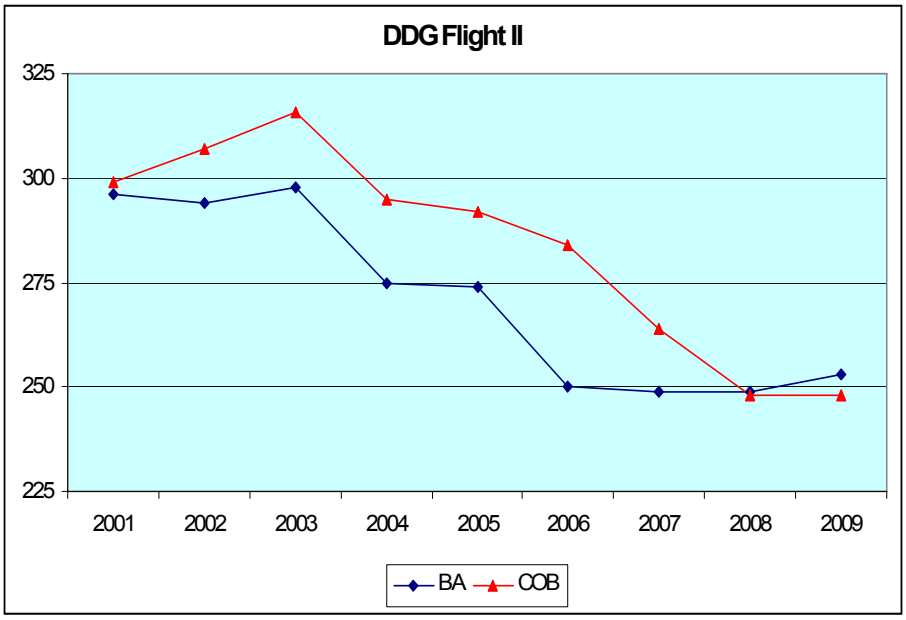


Figure 8. FFG manpower and manning trends

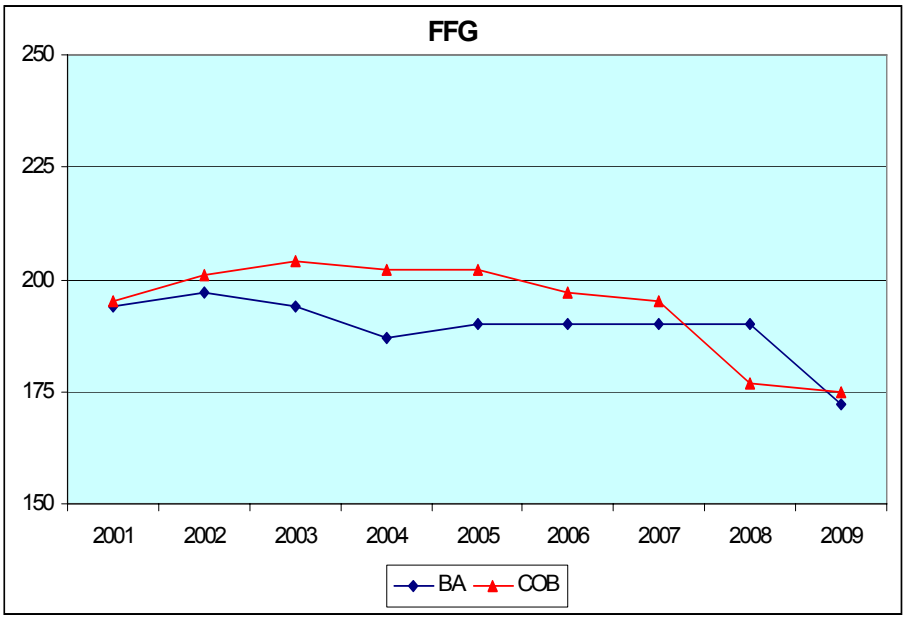


Figure 9. LSD manpower and manning trends

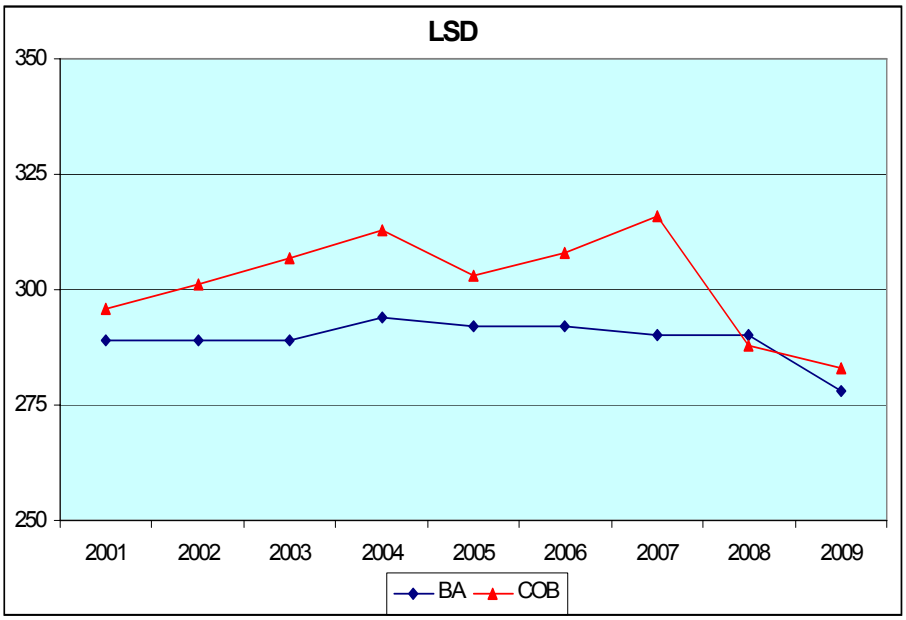
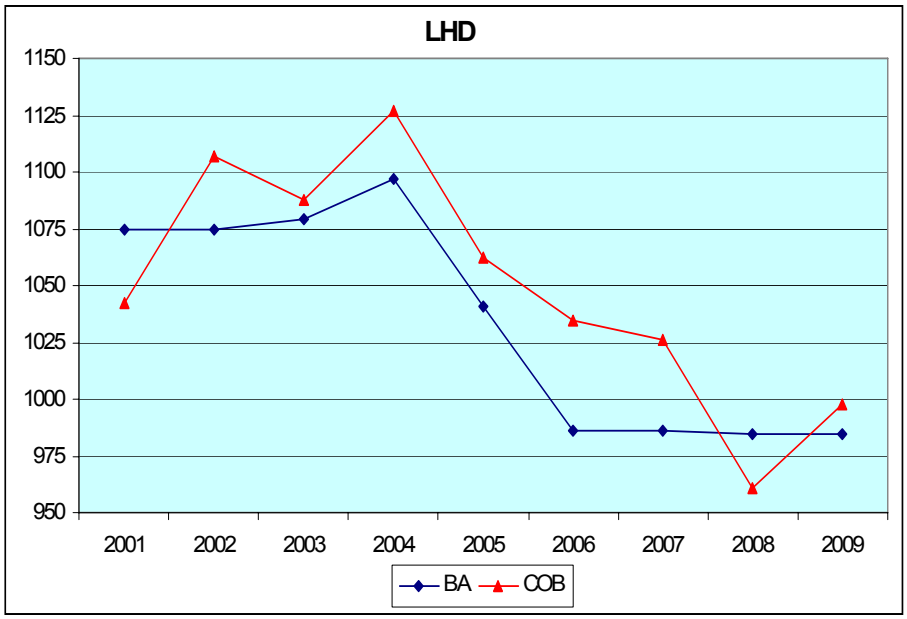


Figure 10. LHD manpower and manning trends



NEC manning

We now turn our attention to NEC manning. A key requirement of optimal manning is the need for all personnel to be fully trained, and NEC manning is a key metric of crew training. Figure 11 shows NEC manning in March 2009.

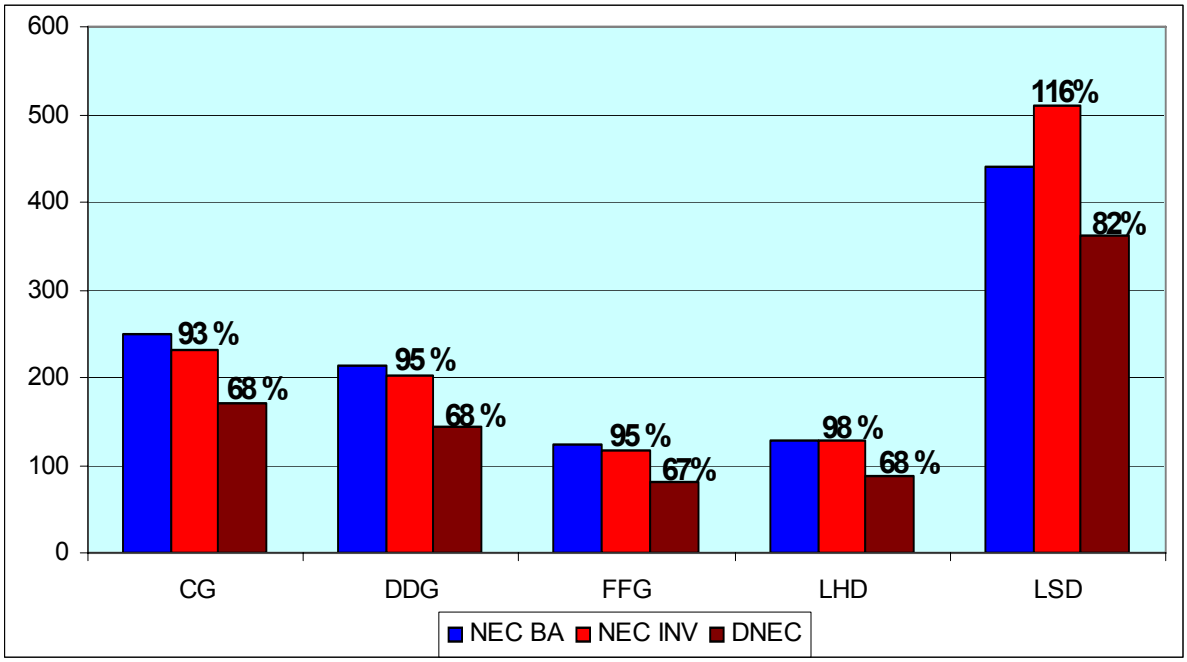
The data need a little explanation because NEC manning is not the easiest metric to define. The metric tries to compare the requirements for NECs with the NECs held by onboard personnel. The NECs are measured in aggregate. In other words, rather than compare individual billet NEC requirements with the NECs held by an individual Sailor, the total requirements are compared with aggregate NECs held by the entire crew. These calculations are constrained by a variety of considerations:

- **DNECs.** A billet may be coded for no more than two NECs, but some Sailors may have many NECs. This raises the question of whether it is advisable to count all of the NECs held by a Sailor against the requirements. The distribution system addresses

this situation by assigning distribution NECs (DNECs) to personnel, identifying the NECs to be used on this assignment. No more than two DNECs are assigned to a person.

- **Paygrade.** Most NECs have constraints regarding which paygrades are valid for the NEC. For example, an NEC might be valid for E5 or E6 personnel. Hence, personnel advancing from E6 to E7 may no longer be counted as meeting NEC needs.
- **Rating.** Most NECs have constraints regarding which ratings are valid for the NEC.

Figure 11. NEC manning—March 2009



The practical validity of these constraints will vary with the type of NEC: NECs that are used frequently and help "define" the assignment need to be filled by personnel in the correct rating and paygrade. Other NECs, however, may be required and used infrequently, and it does not matter who on board has the skill. For example:

- Aegis-qualified personnel (NEC 1107, Aegis Radar System (Spy 1A) Technician) is a “closed loop” community within the FC rating. The NEC defines the skill and assignment, and correct rating and paygrade are required
- NECs 4720, Gyrocompass Maintenance, would be used infrequently and the rating and grade is less important. However, it is very important that someone onboard has this NEC.

Consequently, there is no one formula for NEC Fit that captures how well onboard personnel meet the unit’s needs. In figure 11, we display some recent NEC manning statistics. We compute NEC manning in two distinct ways:

- NEC INV = total NECs required by the ship that are held by someone aboard
- DNEC = total NECs required by the ship that are held as DNECS by someone aboard.

We observe that NECs held in inventory statistics are fine (95+ percent), though we may be allowing one Sailor to meet the requirement for several NECs. This may be acceptable for a rarely used NEC, but it is inappropriate for NECs that are used frequently during an assignment.

The DNEC statistics are mostly around 68 percent. Note that we do not apply paygrade and rating constraints to the DNEC computations, which would further reduce the statistics, and bring them into line with official Navy statistics. The Navy’s official NEC manning statistics are reported in the COGNOS information system, and some recent data showed NEC manning at approximately 58 percent [11]. Regardless, DNEC manning is significantly below the 100-percent manning level that is the underlying requirement and foundation for optimal manning.

One major reason for our choice of DNEC manning formula is that it makes it easier to track trends in DNEC manning over the past 7 to 8 years. We display the NEC manning trends for individual ship classes in the following five figures. Figures 12 through 16 show a couple of consistent patterns:

- NEC manning has been largely unaffected by the optimal manning initiative: that is, DNEC manning has remained far below authorizations
- NEC manning has increased perceptibly during the past 18 months. This may be due to increased attention on NEC manning from Navy MPT&E leadership. It is unclear whether further increases in NEC manning are feasible under current policies and procedures.

Figure 12. CG NEC manning

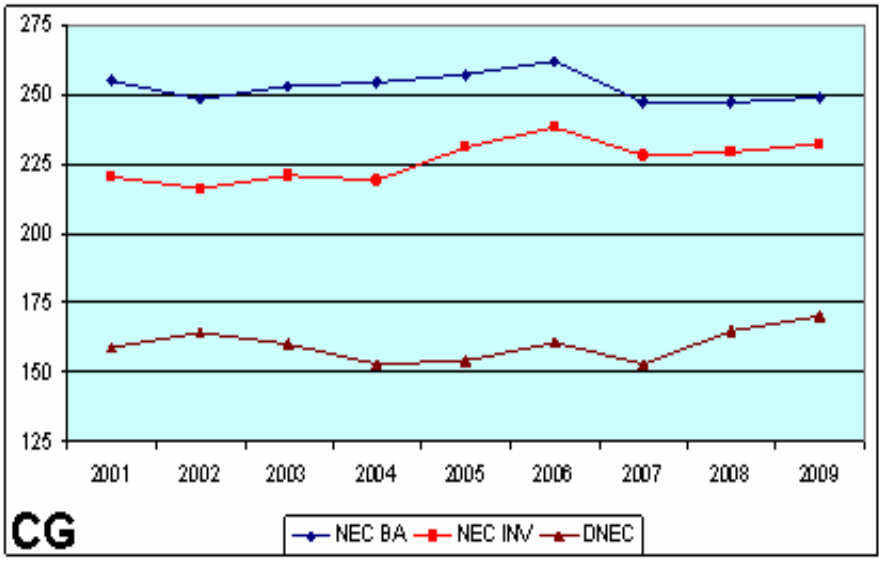


Figure 13. DDG NEC manning

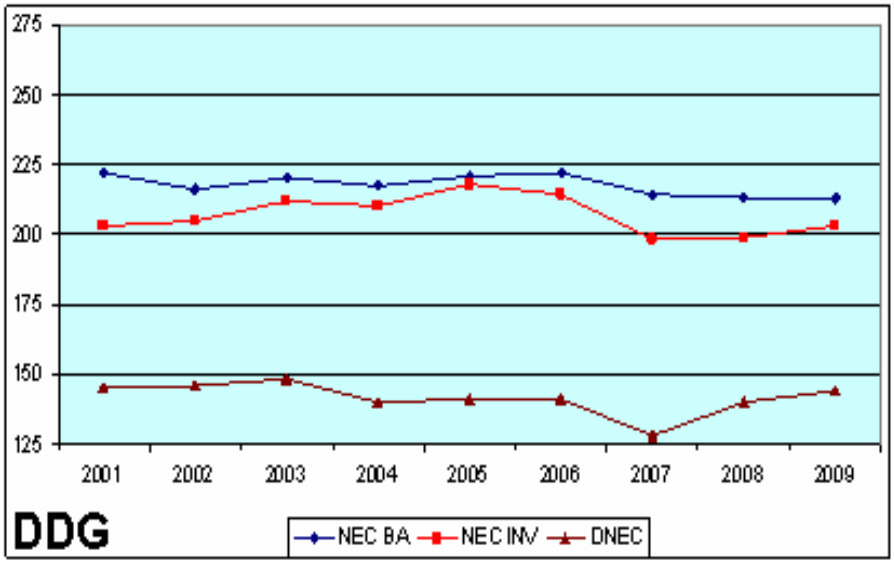


Figure 14. FFG NEC manning

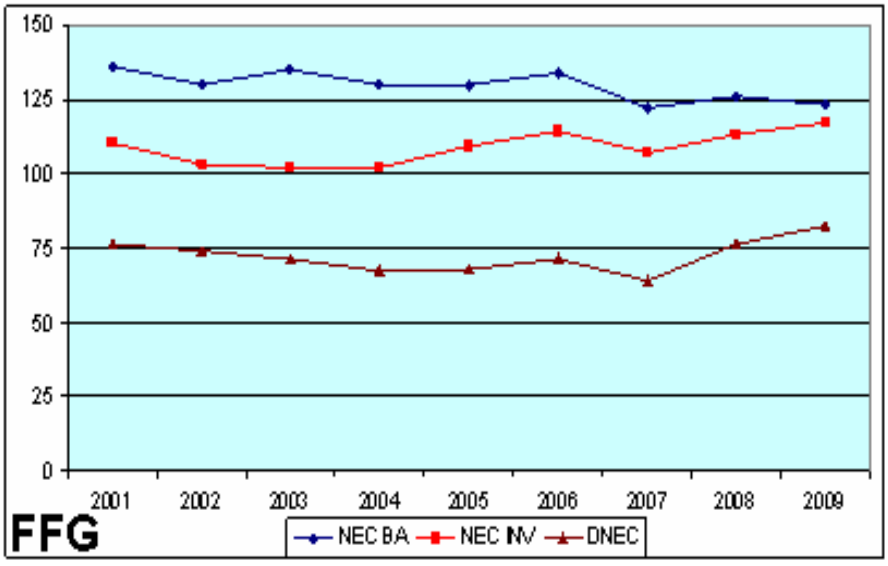


Figure 15. LHD NEC manning

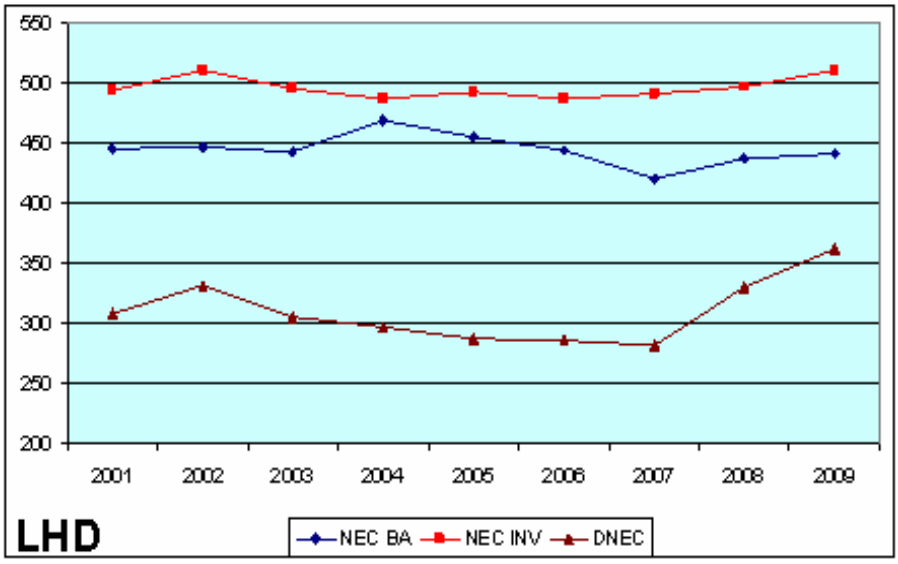
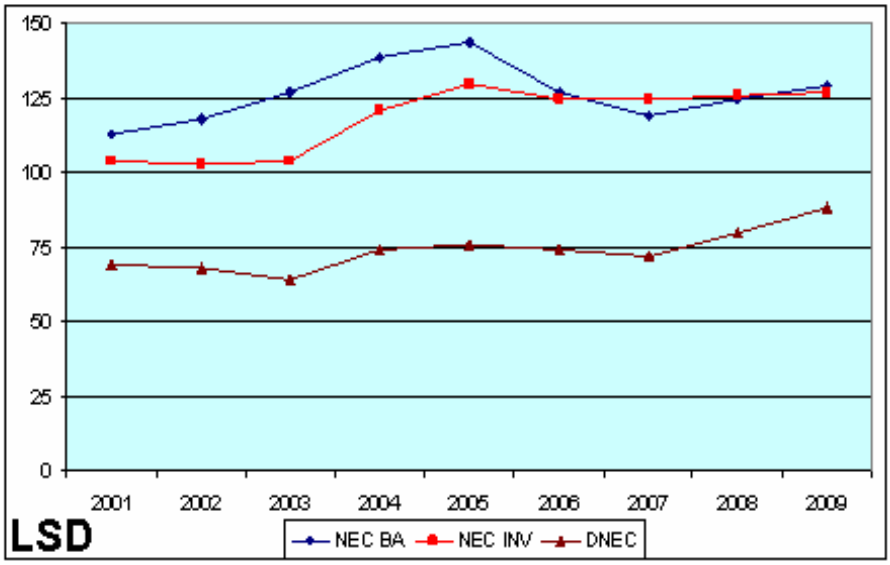


Figure 16. LSD NEC manning



Seniority changes

We now turn our attention to changes in seniority aboard ships. Although we restrict attention to DDG-51 Flight One class destroyers, the patterns we observe apply to other ship classes. We start by considering changes in seniority from prior to optimal manning (OM) up to the present. Table 4 displays pertinent data and shows:

- Optimal manning planned for most manning cuts to come from E1 to E4 paygrades (66 out of 74).
- However, we observe that execution has been different, and there has been a larger than planned cut in E5s (14 instead of 4). The Navy Manning Plan (NMP) figures reflect the supply of personnel and shows the inability of the distribution system to fully man the E5 billets.
- Optimal manning reductions have had little effect on E6 to E9 billets and manning.

Table 4. DDG-51 Flight One seniority changes

Class Avg. Pay Grade	Pre OM SMD	OM II BA (2007)	Current BA	Oct 08 NMP	Mar 09 COB
E1-E3	80	41	45	49	57
E4	98	71	66	66	55
E5	79	75	76	66	65
E6	43	40	38	39	41
E7	18	17	17	17	19
E8	4	4	5	5	3
E9	2	2	1	1	1
TOTAL	324	250	248	243	241

We further consider seniority changes over time. Table 5 shows the transition from 2003 to 2009, and provides similar information:

- 37 of 46 billets cut in past 6 years from E1 to E4
- Inventory is down 69, from overmanning to undermanning (65 of 69 reductions in E1 to E5)

- DDGs are overmanned at E1 to E3, while, in aggregate, they are undermanned
- E5s are consistently undermanned, even when, in aggregate, units are overmanned
- E6 to E9 BA and COB have been stable and aligned.

Table 5. DDG Flight I—seniority trends

	BA				COB				COB loss
	2003	2005	2007	2009	2003	2005	2007	2009	2003-09
E1-E3	59	58	45	45	74	68	56	57	17
E4	89	72	66	66	93	81	64	55	38
E5	79	74	76	76	75	66	68	65	10
E6	43	42	38	38	44	42	41	41	3
E7	18	20	17	17	19	22	21	19	0
E8	4	3	5	5	4	4	4	3	1
E9	2	2	1	1	1	1	1	1	0
Total	294	271	248	248	310	284	255	241	69

Individual augmentees

Individual Augmentation (IA) assignments are unfunded, unplanned, but important supplements of Navy personnel to existing units serving in the Global War on Terrorism.

Most IA assignments have been Temporary Additional Duty (TAD) orders, in which the Sailors' permanent duty stations have been unchanged. Consequently, the impact of IA assignments on ship manning is not captured in the previous data: the reductions in manning described in this subsection need to be added to the manning cuts described earlier. The Navy has recently moved to making some IA assignments permanent-change-of-station (PCS) moves and incorporating them into the distribution process. As a result, some of the impact of IAs will now be incorporated into the types of data described earlier in this report.

PERS-4G has tracked IAs by means of an Order Tracking File, and our analysis of IAs is primarily based on these data. More details regarding IA assignments and their impact on personnel can be found in [12] and [13].

Magnitude of IAs

First, we consider the size of IA assignments. We address both officer and enlisted personnel. Figures 17 and 18 show the numbers of IA assignments from surface ships between 2003 to 2008. (Note that the carrier data do not include airwings.)

Figures 17 and 18 show the following:

- The number of enlisted IA assignments has grown each year since 2003.
- The number of officer assignments peaked in 2006.
- These trends are mostly consistent across ship classes.

Figure 17. Number of enlisted IA assignments (2003 to 2008)

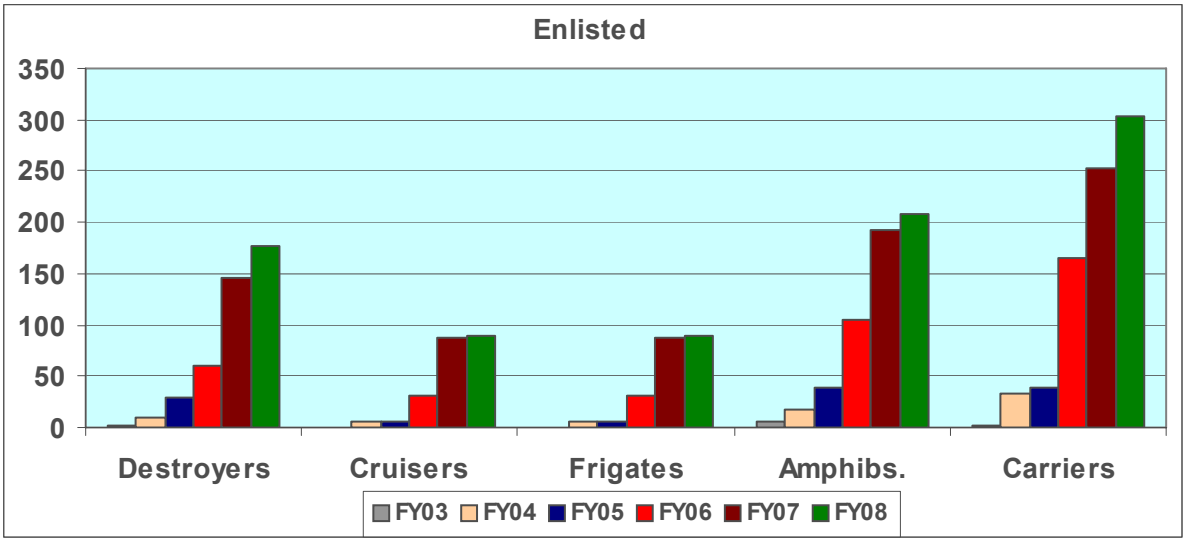
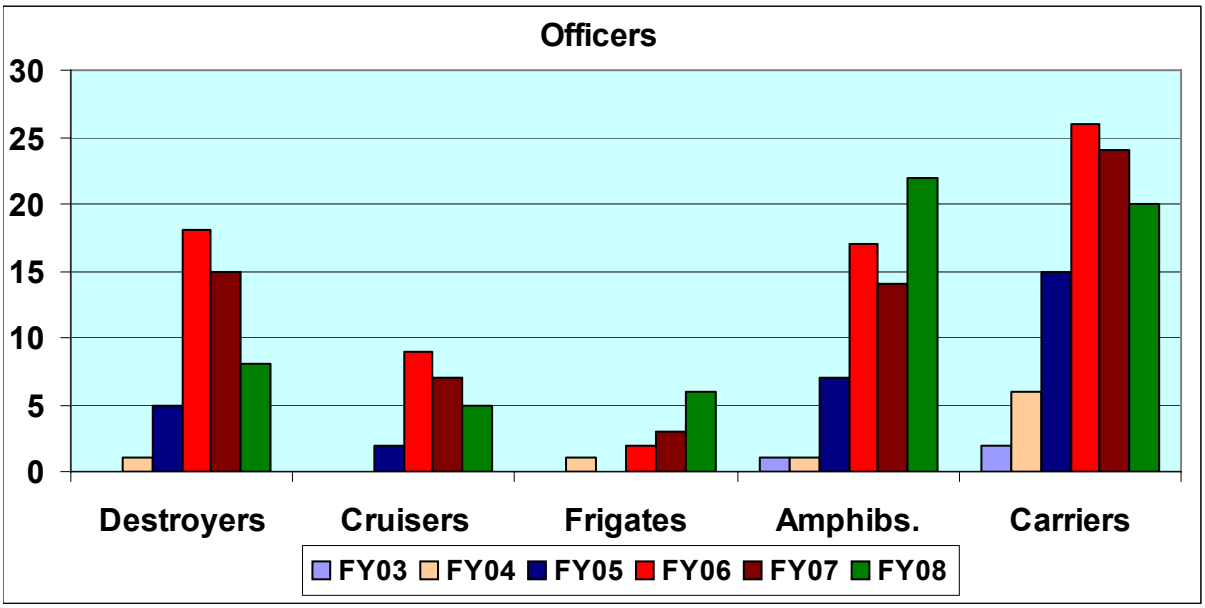


Figure 18. Number of officer IA assignments (2003 to 2008)



The number of assignments does not fully capture their impact on surface ships. We also consider the length of IA assignments to quantify the man-years of labor lost to ships. Figures 19 and 20 display this information and show that (a) enlisted support to IA assignments has grown each year since 2005, (b) officer support to IA assignments stabilized in 2008, and (c) the trends are consistent across ship classes.

The impact of personnel lost to IA assignments needs to be considered in the context of total manning on board the ships. Figures 21 and 22 display man-years on IA assignments as percentages of personnel assigned to ship classes at end of fiscal years. The data show the following:

- For enlisted personnel:
  - — The number of personnel on IA assignments has gradually grown to roughly 1 percent of personnel assigned to ships.
  - — There was a uniform contribution across ship classes until 2008, when frigate numbers increased and carrier numbers decreased.

Figure 19. Enlisted man years of IA assignments from ships

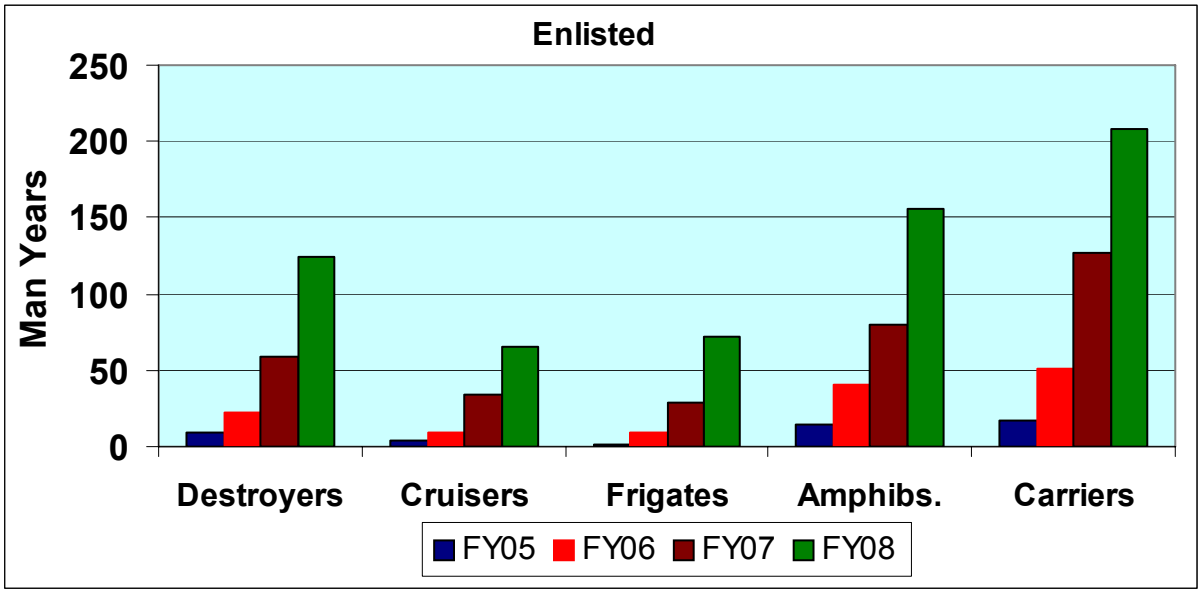


Figure 20. Officer man years of IA assignments from ships

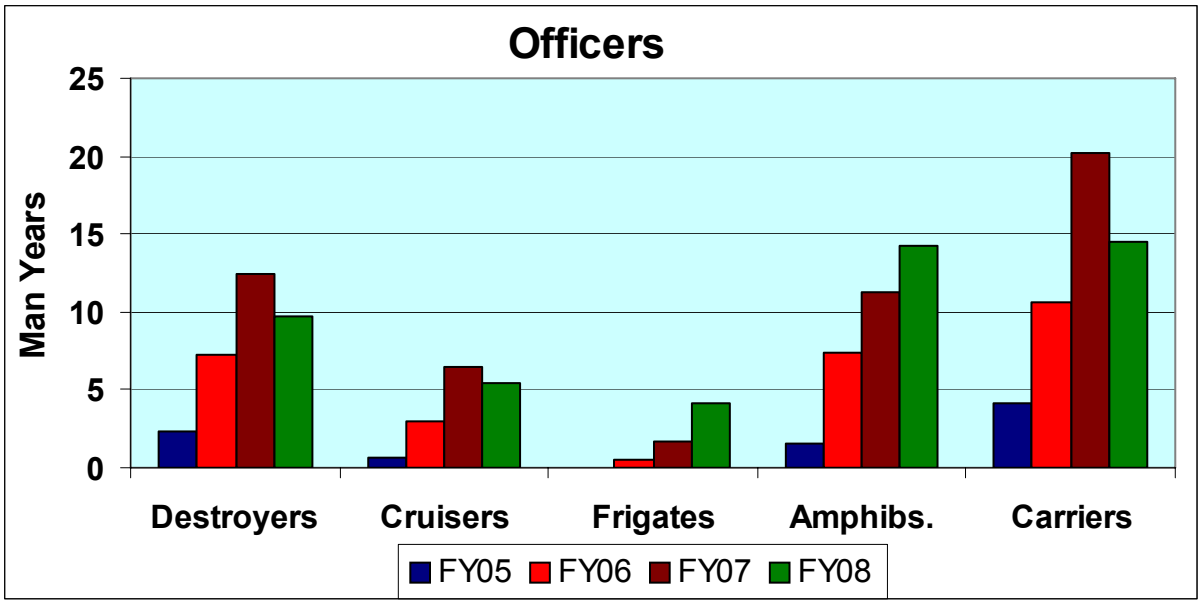


Figure 21. Enlisted IA assignments as a percentage of manning

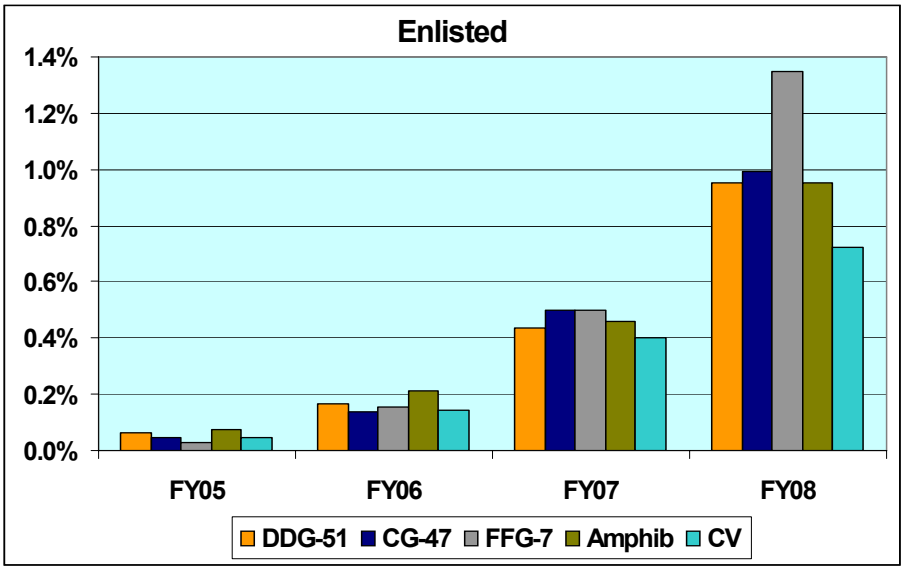
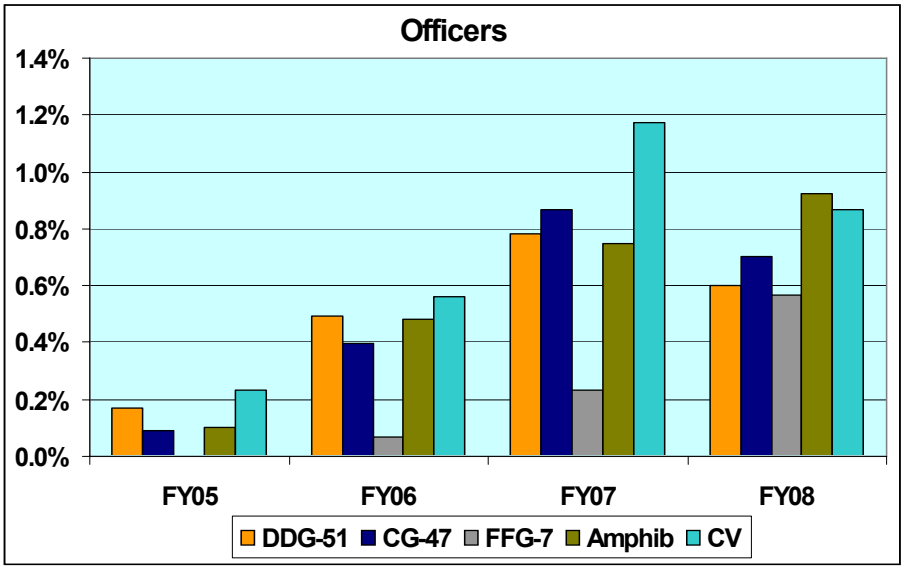


Figure 22. Officer IA assignments as a percentage of manning

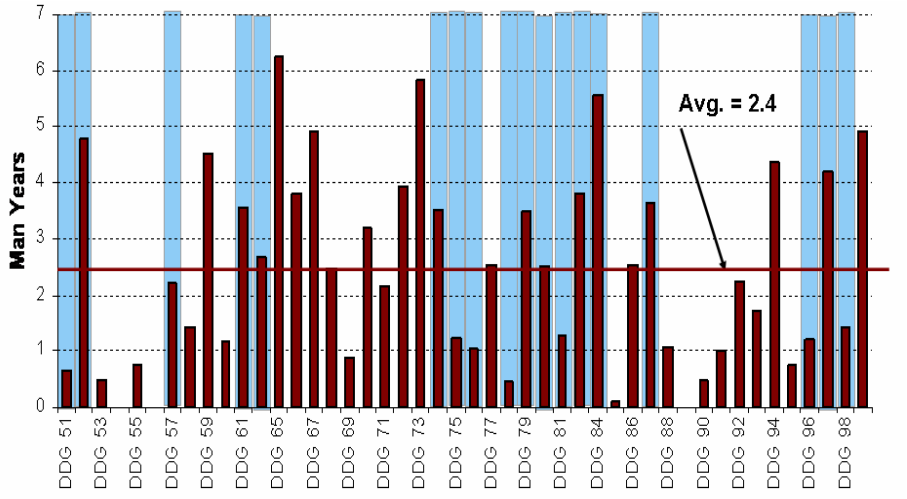


- For officers:
  - — The number of officers on IA assignments has grown gradually to roughly 0.8 percent of officers assigned to ships.
  - — There has been substantial variation across ship classes, although the data are more even in 2008.

Navy personnel managers give priority to the manning of deploying ships and make efforts to align IA assignments with deployment timing to minimize the impact on deployers. In addition, Forward Deployed Naval Force (FDNF) ships in WESTPAC and the submarine force are both exempted from providing individual augmentees by Navy policy.

Here we explore the reality of the situation. Figure 23 displays the man-years lost to IA assignments by individual DDGs during FY 2008.

Figure 23. FY 2008 DDG IA assignments and deployments[a]



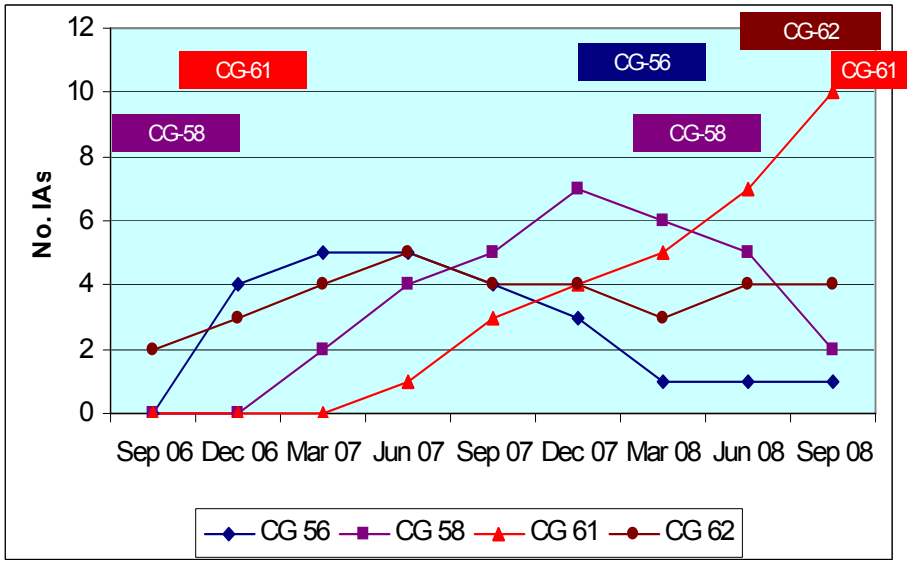
a. Dark bars = man-years of IA assignments; blue bars = deployment during FY 2008.

The dark red bars show the man-years lost from the ship to IA assignments during FY 2008. The blue bars show those ships that had a deployment in FY 2008. Figure 23 shows the following:

- Substantial variation between ships in extent of IA assignments
- No clear relationship between deployers from USA and IA levels
- FDNF ships (DDGs 54, 56, 62, 63, 82, 85, and 89) are indeed exempt from IAs.

Figure 23 is a point-in-time snapshot. We also consider how IA assignments have varied over time from individual ships and examine whether deployment schedules had a discernible effect. Figure 24 shows variations in number of IAs from four CGs during 2006 to 2008. The colored bars show when the cruisers deployed. There is significant variation over time and no clear relationship between deployments and IA levels. The reality of the situation appears to be that, in spite of good faith efforts to limit IAs during deployments, this is very difficult to accomplish in practice.

Figure 24. Number of IAs for four CGs from 2006 to 2008[a]



a. NOTE: colored boxes show deployment dates.

We conclude our analysis of IAs by considering which ratings are making the most IA assignments. Table 6 shows the ratings providing the largest numbers of personnel from surface ships (cruisers, destroyers, frigates, and amphibious ships) from FY 2003 to FY 2008. Table 6 shows a gradual increase in the number of IA assignments, with many ratings providing personnel. Information Systems Technicians (ITs) have provided the largest number of personnel.

Table 6. Top ratings for IAs from surface ships

	Number of IAs						
	FY03	FY04	FY05	FY06	FY07	FY08	Total
IT	2	5	12	36	88	109	253
OS	1	4	14	31	58	66	174
FC		2	3	16	46	45	112
SK	2	2	6	22	36	34	100
YN	2	1	13	10	35	30	89
ET		1	2	11	26	45	85
EN		5	4	5	25	28	62
GM			2	7	25	11	45
STG				9	16	19	44
CS	1	1	29	6	8	27	42
IS		1	10	12	12	6	41
MA		2	3	10	21	5	41
BM		1		2	11	29	40
SH		2	3	4	12	16	37
CTR		3	1	1	12	11	27

Some ratings are larger than others. So, we need to normalize by rating size to more fully observe the impact on the rating. For each rating, we consider the number of Sailors pulled from surface ships for IA assignments as a percentage of personnel in that rating assigned to Surface Navy units.

Table 7 displays the data. We observe large variation across ratings, with a heavy burden on IT and Yeoman (YN) ratings.

This concludes our documentation of the declines in Surface Navy manning during the past 7 years. We now turn our attention to changes in the shore maintenance infrastructure and its impact on the Surface Navy.

Table 7. Number of IAs as share of rating—FY08

	No. IAs	% of Rating		No. IAs	% of Rating
IT	109	5.0%	**CS**	27	1.1%
OS	66	2.2%	**STG**	19	1.3%
FC	45	1.4%	**SH**	16	1.7%
ET	45	2.5%	**GM**	11	0.8%
SK	34	2.4%	**CTR**	11	2.6%
YN	30	5.4%	**IS**	6	2.6%
BM	29	1.1%	**MA**	5	2.1%
EN	28	1.3%			

SIMA/RMC manning

The Navy established seven Regional Maintenance Centers (RMCs) in 2004 and 2005 to provide the Surface Navy with "one stop shopping" for maintenance support.

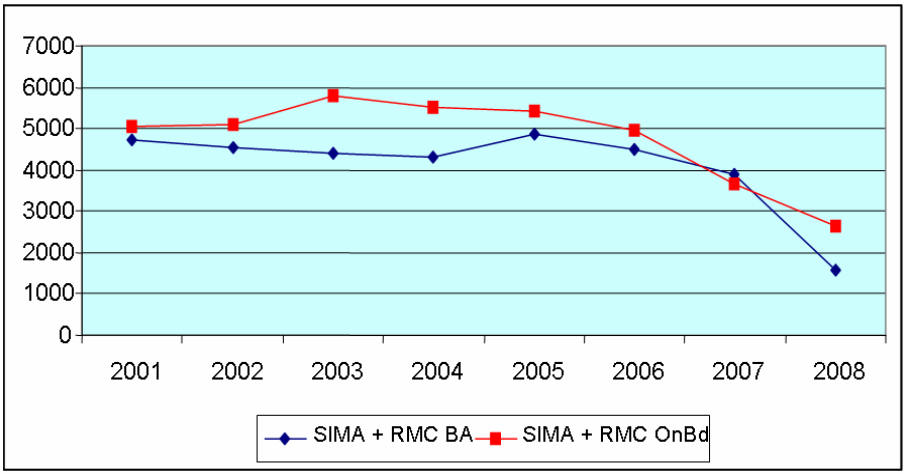
Four Shore Intermediate Maintenance Activities (SIMAs)—Norfolk, San Diego, Mayport, and Ingleside—were absorbed into the RMC organization—MidLant, SouthWest, SouthEast, and South Central, respectively. The initial effect was to move around 4,000 Sailors among the commands, with total manning being unaffected, at first. Subsequently, there were major manning reductions, as enlisted manning was cut in half during 2007 and 2008. These reductions were to be accompanied by increased contractor support.

We do not address any possible changes to support received by the ships under this evolution. This is not, at this time, of concern to the Surface Warfare Enterprise. Instead, we focus on the impact of civilianization of billets on enlisted personnel career development. SIMAs have traditionally provided in-rating shore duty where personnel could hone and advance their expertise before rotating back to sea. The SWE has expressed concern that the loss of in-rating shore duty opportunities will reduce expertise of Sailors when they rotate back to sea. We analyze this situation next.

First, we address the extent of manning reductions. Figure 25 shows the decline in enlisted authorizations and onboard personnel in the RMCs/SIMAs. We see a sharp decline in authorizations since 2005, with declines in inventories lagging behind. As discussed earlier, this is to be expected: it takes 2 to 3 years for the effects of billet cuts to be experienced, as personnel gradually leave and are not replaced.

Because the inventory reductions occurred recently, the effect of the billet reductions will not be fully felt for another year or two, when personnel who have lost in-rating shore duty rotate back to sea.

Figure 25. SIMA and RMC: enlisted BA vs. inventory



The billet reductions are tabulated in table 8, which shows data for the largest ratings. The ratings are, as one would expect, the primary maintenance ratings aboard ships. The extent of billet reductions varied widely across the ratings, with some ratings, notably hull technicians (HTs), experiencing very large reductions.

Table 8. Largest ratings in SIMAs/RMCs

	BA		ONBD	
	2004	2008	2004	2008
HT	667	73	618	143
MM	660	338	897	497
EN	473	149	480	271
EM	427	162	540	285
BM	364	49	419	142
ET	291	199	386	245
GSM	227	60	282	113
MR	177	47	201	58
FC	113	40	210	100
DC	105	9	149	61
IC	102	38	169	75
SK	96	17	116	29

To understand the impact of these billet reductions, it is necessary to consider them in the context of rating size and manpower changes in the entire rating. These reductions may have little impact on career development if they have been accompanied by corresponding reductions in sea billets. We need to examine overall changes in rating size and distinguish between sea duty and shore duty. Table 9 displays the appropriate data.

Table 9. Sea/shore billet cuts

	SIMAs/RMCs Billets		ALNAV Shore Billets		Change in Shore Billets 2004 to 2008		ALNAV Sea Billets		2004 to 2008 Change %	
RATING	2004	2008	2004	2008	SIMA/RMC	ALNAV	2004	2008	Shore	Sea
HT	667	73	1856	846	-594	-1010	2147	1709	-54%	-20%
MM	660	338	6705	5399	-322	-1306	12212	9649	-19%	-21%
EN	473	149	2354	1521	-324	-833	4076	3709	-35%	-9%
EM	427	162	3576	2662	-265	-914	5230	4746	-26%	-9%
BM	364	49	3081	1630	-315	-1451	4113	3772	-47%	-8%
ET	291	199	7531	5525	-92	-2006	8196	7741	-27%	-6%
GSM	227	60	1046	689	-167	-357	2209	2097	-34%	-5%
MR	177	47	572	317	-130	-255	511	412	-45%	-19%
FC	113	40	3348	2101	-73	-1247	4398	4137	-37%	-6%
DC	105	9	1456	978	-96	-478	2655	2156	-33%	-19%
IC	102	38	1077	708	-64	-369	1728	1520	-34%	-12%
SK	96	17	5364	4272	-79	-1092	5486	5620	-20%	2%

The central columns in table 9 show the SIMA/RMC reductions in comparison to overall changes in shore billets in the same time frame (2004 to 2008). There is large variation: SIMA/RMC reductions for the HT rating are roughly 60 percent of total shore manpower reductions, while SIMA/RMC reductions for electronics technicians (ETs) are less than 5 percent of total shore billet reductions.

The columns to the right of center in table 9 show the change in sea billets during 2004 to 2008. The final two columns compare the reductions in shore billets with the reductions in sea billets. There is considerable variation. The machinist mate (MM) rating has experienced similar reductions to both sea and shore duty. Consequently,

career development patterns for MMs do not appear to have been adversely affected by billet cuts in the RMCs. Conversely, shore manpower reductions for HTs and machinery repairmen (MR) have been much larger ashore than at sea, and the billet cuts in the RMCs are a large share of the shore reductions. Consequently, HT and MR career progression does appear to have been affected by RMC billet cuts. Similar calculations and considerations can be applied to each of the ratings, and we observe that in most ratings shore manpower reductions have been significantly larger than sea manpower reductions, raising concerns regarding career progression.

We do not, as yet, know the impact of the billet cuts at the RMCs. We can infer them, however, by looking at historical patterns regarding the numbers of personnel rotating out of SIMAs/RMCs.

Table 10 displays the numbers of personnel rotating from SIMAs/RMCs back to surface ships during 2001 to 2008. In past years, there were usually 500 to 600 personnel rotating each year from SIMAS/RMCs to surface ships. In the past couple of years, that number has dropped to just over 300. We can anticipate the numbers dropping further as the effects of the billet cuts are fully played out.

Table 10. Personnel rotating from SIMAs/RMCs to surface ship

	2001	2002	2003	2004	2005	2006	2007	2008
Destroyers	133	169	148	155	150	176	160	114
Cruisers	63	93	89	60	66	83	69	43
Frigates	83	79	90	89	112	85	72	57
Amphibious ships	158	231	198	232	204	235	204	95
Total	437	572	525	536	532	579	505	309

Note that the data in table 10 are annual flows of personnel from SIMAs/RMCs to ships. Sea tours are for at least 3 years, so the cumulative effect of this lost experience on ship manning will be at least 3 times the numbers shown.

Finally, we consider the paygrade distribution of the personnel rotating out of the SIMAs/RMCs back to sea. Table 11 describes the

average grade distribution for all such personnel between 2001 and 2008, and it shows that most of the personnel are experienced petty officers.

Table 11. Grades of personnel rotating from SIMA/RMC to surface ships (2001–2008 average)

Grade	Percentage
E1 to E3	6%
E4	12%
E5	39%
E6	30%
E7	10%
E8	2%
E9	1%

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Training

Training occurs in many ways, including schoolhouse, individual training on board ships, and unit-level training. In this decade, there have been fundamental changes to Navy training. A key impetus to these changes was a comprehensive review of Navy training at the start of the decade. This review produced the so-called Revolution in Training [14], which had the following objectives:

- Decrease time to train
- Increase training effectiveness
- Reduce training costs
- Minimize time away from command
- Harness technology
- Use blended approach
  - Instructor led
  - Computer-based training (CBT)
  - Simulations
  - Lab/technical training equipment (TTE).

Following the Revolution in Training report, there have been many changes in Navy training, including consolidation of resources and greater reliance on CBT. The briefing titled “Taking a Fix” [1] raised concerns that some of the training initiatives were having a negative effect on crew proficiency. The following initiatives were identified as causing problems:

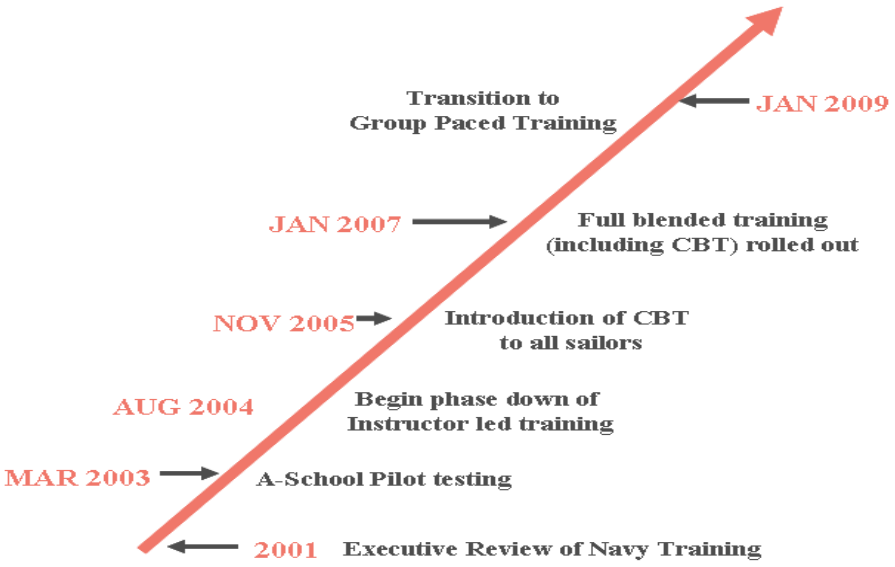
- Less hands on training, no hot plant, and more CBT
- ATG manning reductions
- Disestablishment of the Aegis Training Readiness Center (ATRC) Waterfront Detachment.

In the following subsection, we address these concerns and look for evidence that there have been problems with crew proficiency.

Individual training

It has taken time to implement the Revolution in Training's recommendations for changes to the Navy's large schoolhouse training system. Figure 26 shows the time line of these changes.

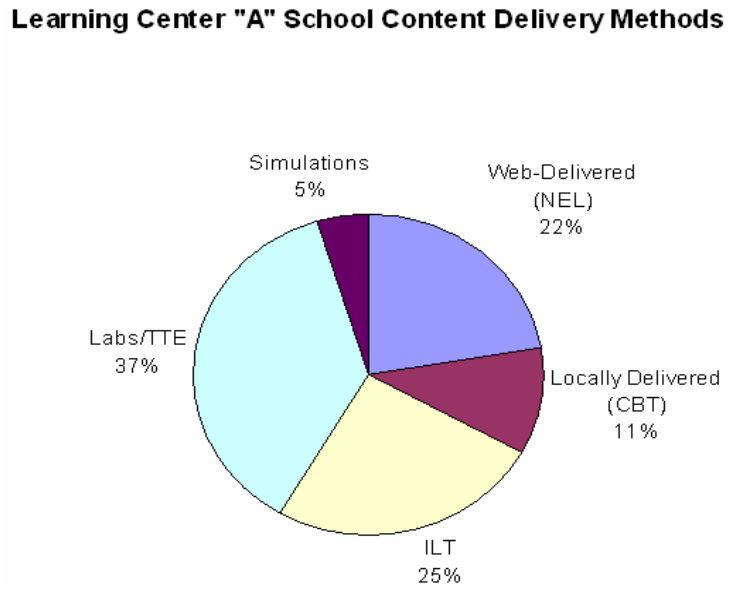
Figure 26. Schoolhouse training changes from 2001 to 2009



We investigated concerns regarding the impact of computer-based training. This is a difficult issue: it is comparatively easy to document changes in training delivery methods, but it is much harder to measure proficiency, and then relate any changes in proficiency to changes in training.

We address this topic by first considering the extent of CBT in schoolhouse training. Figure 27, provided by the Naval Education and Training Center (NETC), shows the extent of CBT in A-school training [15].

Figure 27. A-school delivery methods



Observe that locally delivered CBT accounts for only 11 percent of instruction. In addition, web-delivered training (Navy e-Learning) accounts for 22 percent of instruction. Traditional instructor-led training (ILT) and labs/TTE, however, account for 62 percent of training. So, the extent of training on computers, while significant, should not be overstated.

Most of the concerns raised regarding Sailor proficiency relate to an inability to maintain equipment. However, this knowledge is largely taught in C-schools, with A-schools addressing occupational standards. There has been minimal introduction of CBT into C-schools, which suggests that technical performance deficiencies are not strongly related to CBT initiatives.

CNA previously analyzed the effects of CBT on Sailor proficiency [16]. This study found that Sailors who received CBT in A-schools experienced no apparent ill effects in success at C-schools or in later career progression. We also understand that there are many factors that affect success at schools and career progression, and it is more desirable to have direct measures of Sailor learning and performance.

Individual training is delivered (and received) in many ways, including schoolhouse training, onboard on-the-job training (OJT), and online training. We need to consider the totality of training to more fully understand training deficiencies and how to fix them.

Anecdotal data suggest that:

- Roughly 10 percent of crewmembers leave ships for training.
- OJT imposes large workload on OJT supervisors and, following manning cuts, senior personnel have less time to supervise OJT.
- Onboard CBT is affected by satellite access, bandwidth limitations, and numbers of computers, particularly for FFG-7s.

The extent and impact of these concerns is unclear. We need more information on OJT processes and training rotations while aboard ships to fully assess training initiative impacts. Further analysis, beyond the scope of this study, is required in this area.

Afloat Training Groups

Afloat Training Groups (ATGs) provide unit-level training to the fleet, certify ships as having successfully completed unit-level training, and are an integral part of how the Navy trains its ships. Figure 28 shows enlisted manning during this decade, including a decline in authorizations in 2007 but almost constant manning levels since 2006. The onboard inventory is consistently below authorizations and currently at 86 percent, which is typical for a shore command.

Figure 29 shows officer manning during the same time frame. Inventories have consistently been above authorizations, though this may be somewhat overstated. Conversations with ATG staff indicate that numerous officers assigned to ATGs have used the opportunity of shore duty to take graduate degrees while assigned to their staff.

The above graphs may be a little misleading and understate problems with manning levels in ATGs. ATGs have undergone changes in this decade, merging with other commands on the waterfront, and there have been many changes to ship's workup cycles, as well as increased

OPTEMPO with the introduction of the Fleet Response Plan (FRP). Total personnel numbers do not capture what has happened to the ATG workload.

Figure 28. ATG enlisted manning

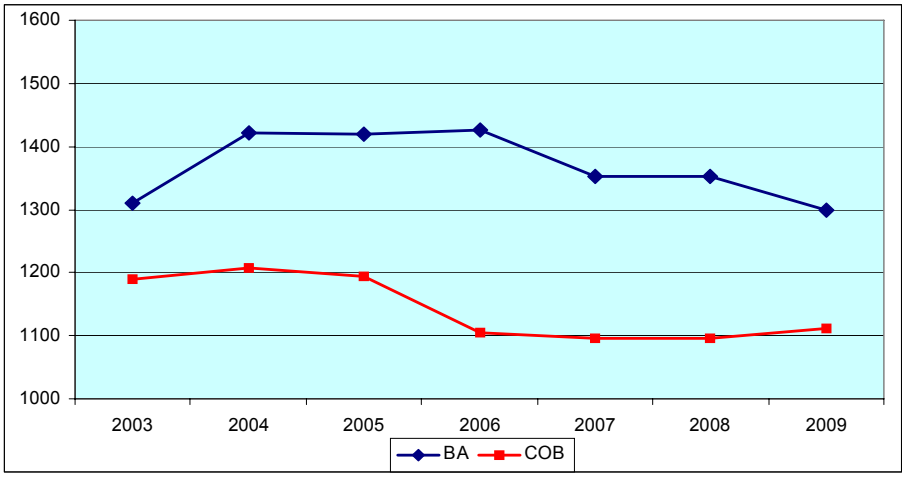
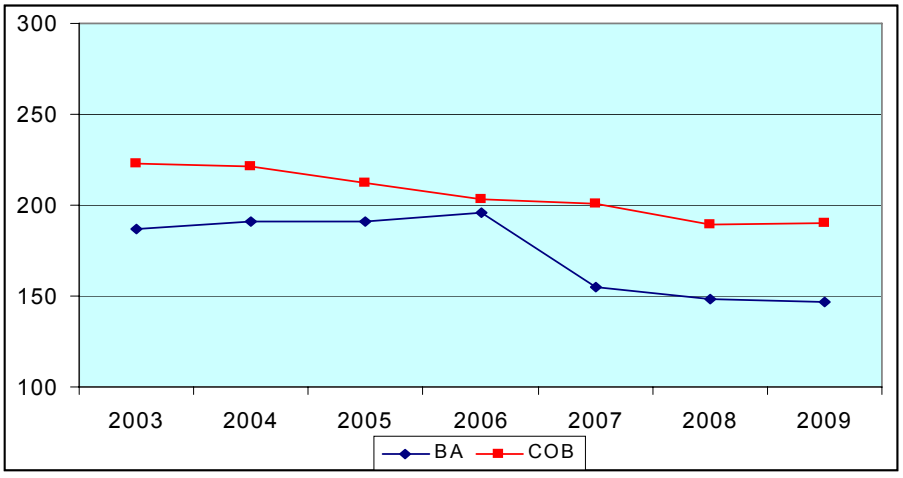


Figure 29. ATG officer manning



We discussed workload with ATG staff, who observed the following:

- They can perform their certification mission but have less flexibility to react to emergent events. For example, unit-level training (ULT) has been a low fleet priority, and the required 16 weeks of ULT has been squeezed by operational commitments. Current ATGs can provide ULT if they have the required dedicated time, but they lack the resources to provide appropriate training when schedules change and ULT time is fragmented.[1]
- In the past, ATG could react to emergent requirements; they now require 2 to 3 months' notice for tasking

There are some data to support these assertions: a recent increase in extensions to certifications suggests that ATG support has lessened.

The situation varies as one moves from one fleet concentration area to another. Table 12 shows the number of ships and ATG staff in different ports. The COB per ship data show that Norfolk has fewer ATG staff per ship than in other locations. Moreover, this situation is magnified by the workload caused by aircraft carriers, which are not included in the COB/ship calculations.

Table 12. ATG enlisted manning to ships ratios[a]

	BA (9/08)	COB (9/08)	Ships	COB/Ship	CVNs
Norfolk / Little Creek	364	305	55	5.5	5-6
San Diego	444	361	54	6.7	2
Mayport	181	152	21	7.2	--
Pearl Harbor	142	106	11	9.6	--
Japan (Yokosuka / Sasebo)	151	113	16	7.1	1
PacNW (Everett / Bremerton)	70	58	6	9.7	2

a. MCMs in Bahrain included in San Diego data.
PCs in Bahrain included in Norfolk data.
We count hulls, not crews, for PCs and MCMs.
Does not include LCC in Gaeta and AS in Guam.

1. Second Fleet has recently increased the priority of ULT in response to ATG concerns

ATRC disestablishment

In 2004, the Aegis Training Readiness Center was absorbed into the newly created Center for Surface Combat Systems (CSCS). In connection with the CSCS standup, five ATRC detachments—Norfolk, San Diego, Mayport, Pearl Harbor, and Yokosuka—were redesignated as CSCS detachments:

- The ATRC detachments in Norfolk and San Diego became CSCS detachments.
- The ATRC detachments in Mayport, Pearl Harbor, and Yokosuka merged with Fleet Training Center (FTC) detachments to become CSCS detachments.

The mergers were directed as part of the Navy's Revolution in Training. The redesignation was intended to bring the detachments in line with the new CSCS organization. Some cuts in personnel and training course offerings followed the redesignation. Enlisted manning at the detachments was reduced by roughly 40 service members, although the size and impact of the manning cuts was obscured by the mergers with FTC.

As noted, the reorganization led to some cuts in training courses. Five courses were cut in 2004:

- CIC Team Training
- Force Air Defense Commander
- Combat System Team Training
- Radio Team Training
- CSOSS Phase II.

The impact of these cuts will be felt in mission readiness, and COMPTUEX air defense exercise results have shown a noticeable downward trend in the past few years [17].

Navy leadership appreciates that there are problems with Air Defense proficiency. RDML Hicks, Program Director for Aegis BMD, recently reviewed the state of Air Defense [18] and made the following

observations regarding current problems and required changes to training:

- Systemic C3I issues are affecting Air Defense and Combat Readiness, created by
  - — Consistent introduction of new Combat Systems Baselines and Data Link equipment/software with known defects and interoperability issues
  - — Inadequate training and limited fleet experience
  - — Unintended consequences from manpower and personnel actions/initiatives during the past 5 to 7 years
- Cumulative effects affecting Strike Group and Air Defense Commander ability to execute Command and Control of Air Defense units. Recent observations include:
  - — Missed Intercept Opportunities, Queries, SOFAs, Warning and Cover Orders
  - — Incursions into the CIEA and Vital Areas
  - — Cover & Engage issues
- Training requirements
  - — Identify, empower and resource NAMDC to address acquisition and end-to-end integration of C2 capabilities (composed of multiple systems)
  - — Develop sufficient C3I (LINK, COP, GCCS) training for enlisted personnel to keep pace with technology and increasingly complex C2 systems
  - — Establish a C3I integration team training program
  - — Review alignment of Fleet Collaboration Teams
  - — Resolve ownership and resource team training (CICTT/FADC)
  - — Review Navy Training System Plan (NTSP) alignment for Air Defense C3I and identify shortfalls.

— Mandate NTSP completion and approval before installation

— Review and update officer C3I training

— Create end-to-end integrated systems maintainer training.

Further analysis, beyond the scope of this study, is required in this area.

A final observation in this area was provided by COMNAVSURFLANT staff: the reorganization of ATRC/CSCS and ATGs has led to the end of school team training, an important intermediate step between individual and team training.

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Readiness measures

In the previous sections of this report, we documented reductions in resources in the Surface Navy during the past 8 years. We now turn to measures of ship readiness—the underlying assertion being that resource reductions have hurt surface ship readiness. We address a variety of material readiness metrics:

- Organizational maintenance workload
- CSMP backlog
- SORTS
- INSURV data
- CASREPs.

Organizational maintenance

We start our analysis of readiness measures by considering the organizational maintenance workload on board ships. With the drop in manpower, it's a reasonable hypothesis that it has become harder for the ship to keep up with required maintenance. So, we first examine the workload.

Figure 30 shows the CRUDES organizational maintenance workload per ship during the past 20 years. Figure 31 shows analogous data for amphibious ships. The data come from Navy Visibility and Management of Operating & Support Costs (VAMOSC) database, which gets its data from the Open Architecture Retrieval System (OARS) of 3M data. The VAMOSC manual [19] defines *workload* as follows:

> Number of man-hours expended by the ships' force for the performance of reported organizational corrective maintenance. Ships report corrective maintenance in accordance with current 3M System guidelines.

Figure 30. CRUDES organizational maintenance workload (total man-hours per ship)

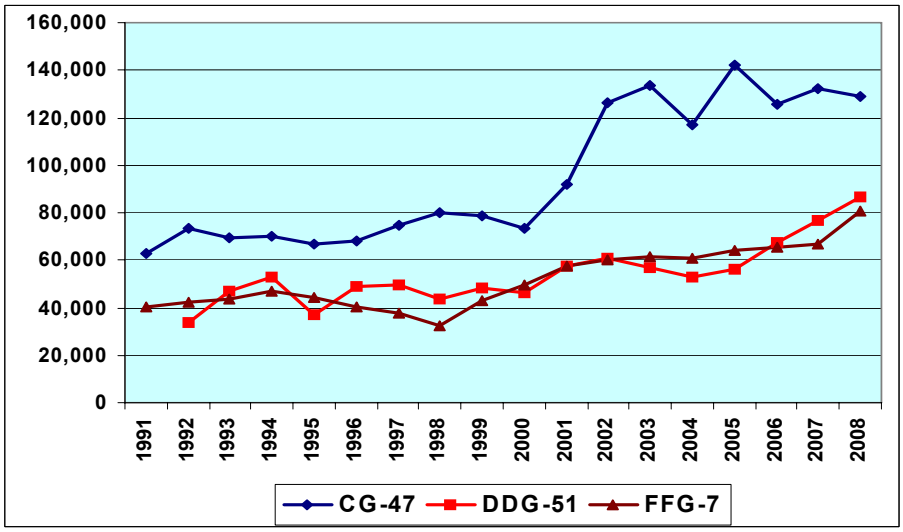
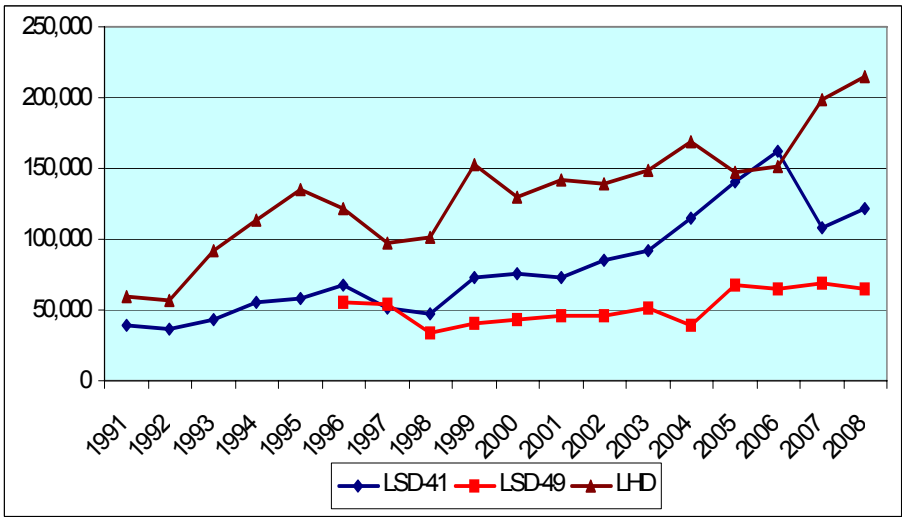


Figure 31. AMPHIB organizational maintenance workload (total man-hours per ship)



Figures 30 and 31 show a pattern of a stable workload during the 1990s and large increases in the past 10 years:

- 75-percent increase in CRUDES workload since 2000
- LSD-41 workload more than doubled in past 10 years
- LSD-49 workload—30-percent increase in past 4 years
- LHD workload more than doubled in past 10 years.

We consider the impact of manning reductions by calculating the workload per crewmember. We divide the workload by the average number of personnel on board during each time period. Figures 32 and 33 show the results of these calculations.

Figure 32. CRUDES organizational maintenance workload (man-hours per Sailor)

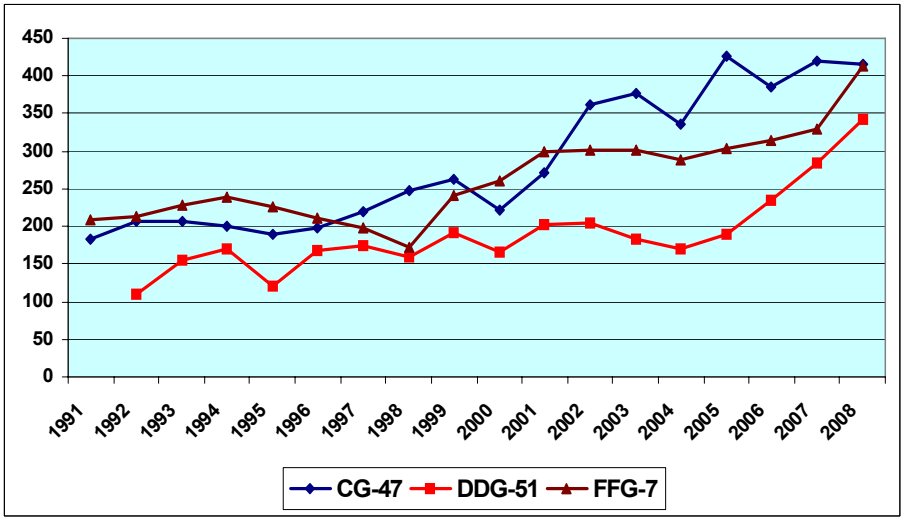
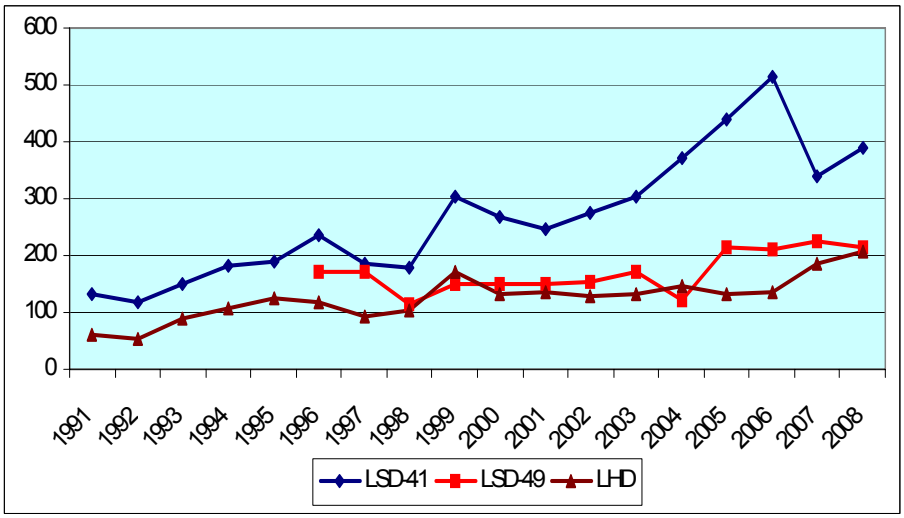


Figure 33. AMPHIB organizational maintenance workload (man-hours per Sailor)



Figures 32 and 33 show that manning reductions have exacerbated the impact on Sailors on DDG class ships, but the increase in per-Sailor workload on other ship classes is the same as the rise in total workload, and is unaffected by manning reductions. The reason for the lack of rise in individual workload may the measures that the Navy has taken during the past several years to reduce workload aboard ships. These measures offset the impact of increased workloads on individual Sailors for most ship classes, but they did not completely offset the impact of manning reductions on DDGs, which have experienced the largest manning cuts.

We wish to emphasize the following point. On DDGs, the 75-percent increase in total workload during the past 10 years has translated into a 100-percent increase in individual workload.

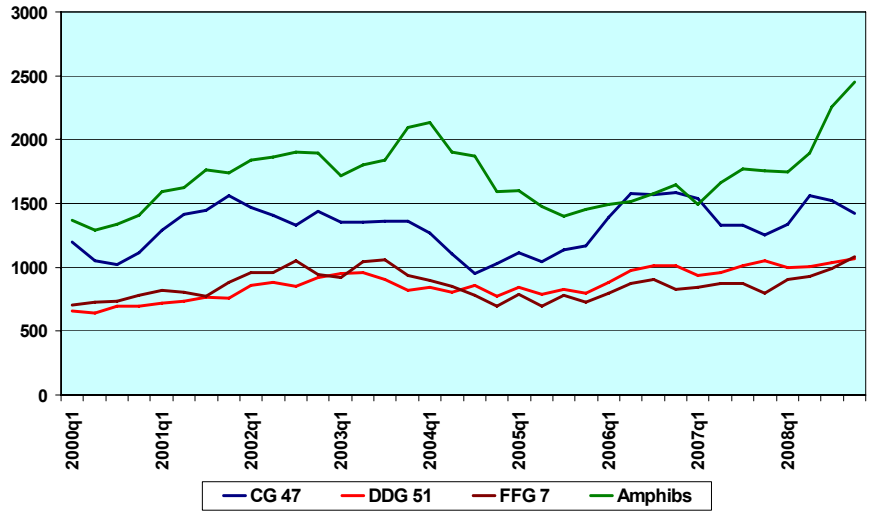
CSMP backlog

The Current Ship's Maintenance Project (CSMP) is a listing of the deferred maintenance and alterations tasks for a particular ship. It measures the ability of the Navy to keep up with required

maintenance. The CSMP includes work to be performed by ship's force and work to be performed by shore maintenance facilities.

Figure 34 shows the CSMP backlog, by quarter, for various ship classes during this decade. The data show that the backlog has fluctuated over time, with a large increase during the past 4 years, especially for amphibious ships.

Figure 34. CSMP backlog per ship per quarter

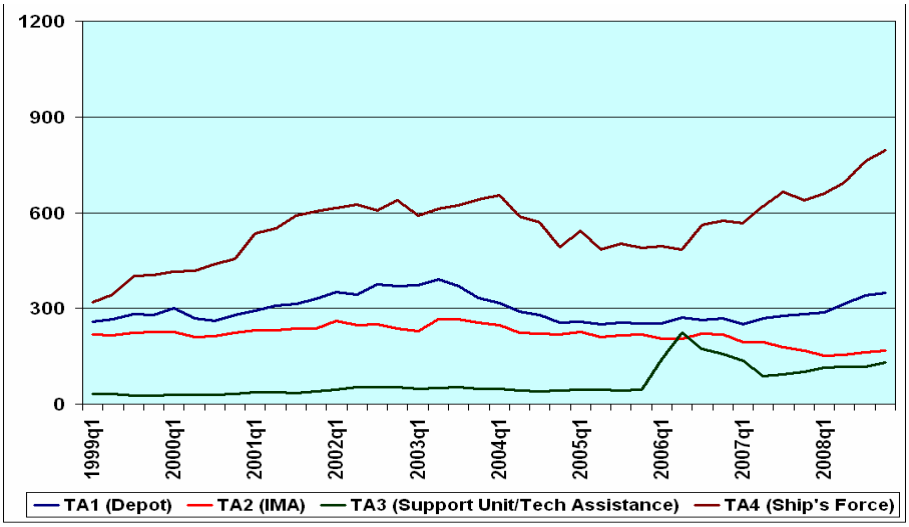


We delve deeper into these data by analyzing whether some types of work are being deferred more than others. Figure 35 displays trends in the CSMP backlog according to different types of availability:

- TA1 - Depot
- TA2 - Intermediate Maintenance Availability (IMA)
- TA3 - Support Unit / Technical Assistance
- TA4 - Ship's Force.

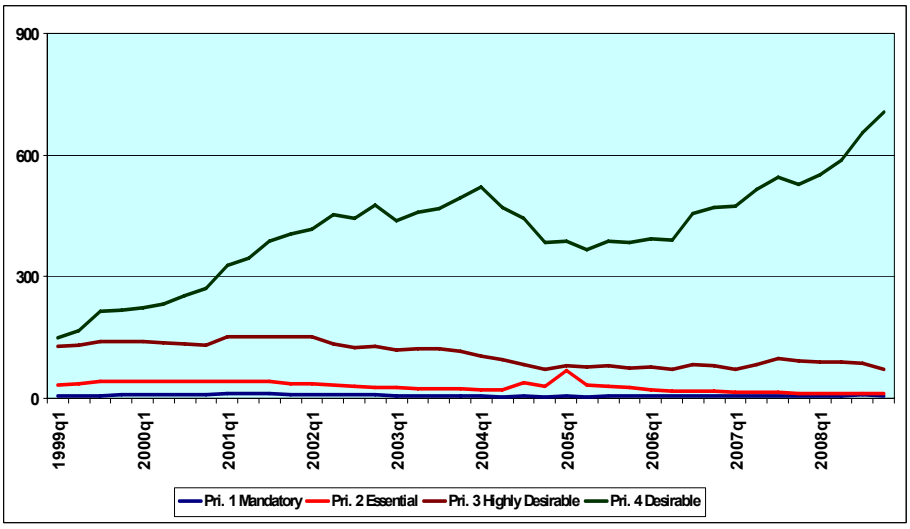
The data are averages over all CG-47s, DDG-51s, FFG-7s, and amphibious ships. Figure 35 shows that the growth in backlog has mostly been in Ship's Force work.

Figure 35. CSMP backlog by type availability



We delve further into the data by examining the type of Ship's Force work that has been deferred. Figure 36 displays the pertinent data. Figure 36 shows that ships are acting sensibly: they are deferring the lowest priority work (i.e., *Priority 4, Desirable)* and backlogs for higher priority work have remained relatively constant.

Figure 36. CSMP backlog by priority—Ship's Force work



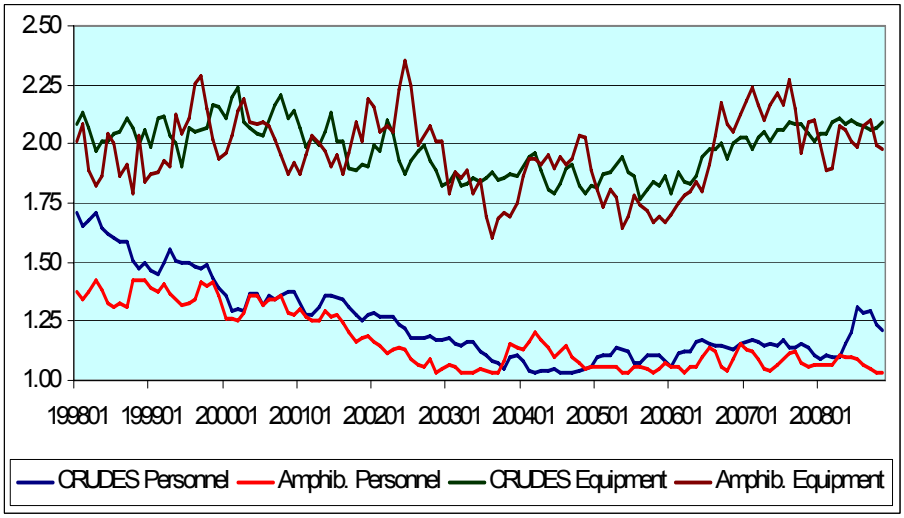
The cumulative picture from these three figures describing CSMP backlog is that the lowest priority work is being increasingly deferred and all other work is being accomplished in a normal, relatively stable fashion.

SORTS

We looked at SORTS data to see if there were any relevant trends in SORTS statistics during this decade.

Figure 37 displays SORTS Personnel and Equipment measures for the past 10 years. The data suggest that everything is fine. In fact, the Personnel readiness metrics have improved from the beginning of this decade.

Figure 37. Average SORTS Personnel and Equipment measures—all CRUDES and AMPHIB ships



These results are not surprising. SORTS is a crude measure of readiness that does not capture much of what is actually occurring. In particular, there are a couple of distinct concerns with the Personnel readiness metrics:

- When manpower requirements dropped, the denominator dropped in the calculations. Consider the example of DDGs. Authorizations dropped from 289 to 247 during the past several years. Consequently, current manning of 240 is 97 percent and has excellent SORTS Personnel readiness
- A tenet of optimal manning is that units need to be manned at 100 percent of requirements. However, this is not reflected in SORTS Personnel readiness measures. (Thresholds for P-levels were not changed following the introduction of optimal manning.)

INSURV results

INSURV inspections are the Navy's formal method of evaluating ship readiness. Ships undergo extensive evaluations during an INSURV, which lasts several days. The evaluations are a mix of detailed empirical observations and expert judgment. Reference [20] is the governing instruction and provides details on the content of INSURVs.

The Navy conducts roughly 30 INSURV inspections a year, and a few ships tend to fail each year. Figures 38 and 39 provide a summary of INSURV results between 2003 and 2008. No trend is evident from the data in these figures. Percentages are not very meaningful because we are dealing with small numbers, where one failure is a significant percentage.

The three DDG / CG failures in 2008 are worrisome and have received substantial attention from Navy leadership. We understand that the CRUDES INSURVs are doing better in 2009, and the 2008 data may just have been an anomaly.

INSURV inspections consider the wide variety of missions area on each ship, and we analyzed the results in each mission area, looking for evidence of trends in INSURV results. Figure 40 displays average scores for each mission area during 2003 to 2008. No trend is evident. A more detailed analysis of the INSURV results shows that the propulsion mission-area evaluations are most strongly correlated with the pass rate, although the correlation isn't that strong. Overall, INSURV results do not indicate any trends.

Figure 38. INSURV results—CGs and DDGs

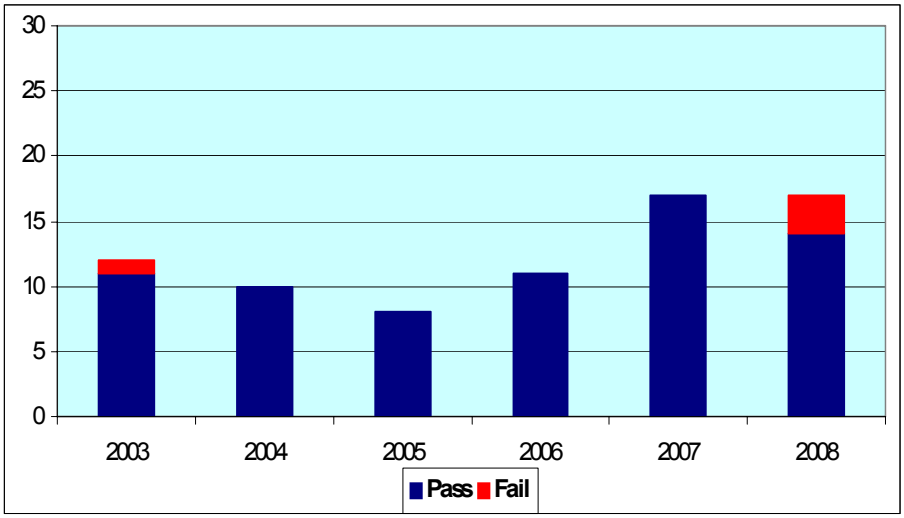


Figure 39. INSURV results—other surface ships

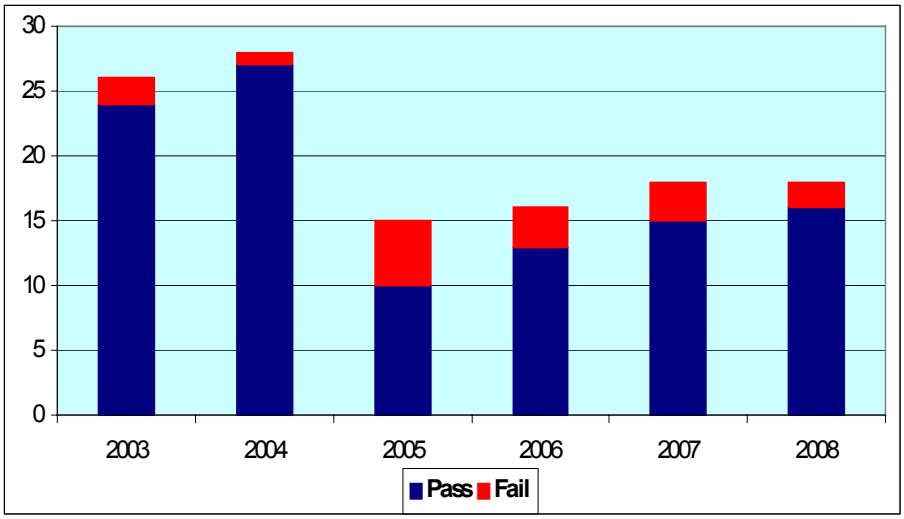
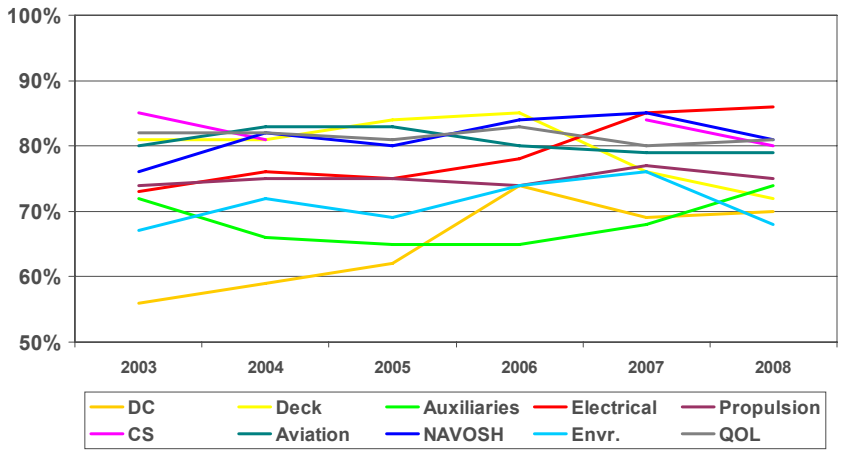


Figure 40. INSURV Surface Navy mission-area scores, 2003–2008



CASREPs

Casualty reports (CASREPs) are the final readiness metric that we consider. A casualty is defined as an equipment malfunction or deficiency that cannot be corrected within 48 hours and that fits any of the following three categories:

- C2 CASREP—a deficiency exists in mission-essential equipment that causes a minor degradation in any primary mission, or a major degradation or total loss of a secondary mission
- C3 CASREP—a deficiency exists in mission-essential equipment that causes a major degradation but not the loss of a primary mission
- C4 CASREP—a deficiency exists in mission-essential equipment that is worse than a C3 CASREP and causes a loss of at least one primary mission.

Ships file CASREPs as problems occur, and CASREPs are removed once the problems are corrected. Hence, trends in a list of open CASREPs capture, to some extent, the ability of the Navy to keep up with required ship maintenance.

Figures 41 and 42 show trends in open CASREPs from 1998 to 2008. Figure 41 displays C2 CASREPs; C3 and C4 CASREPs are in figure 42. Both graphs note CRUDES and amphibious ships separately.

Figure 41. Open C2 CASREPs per ship

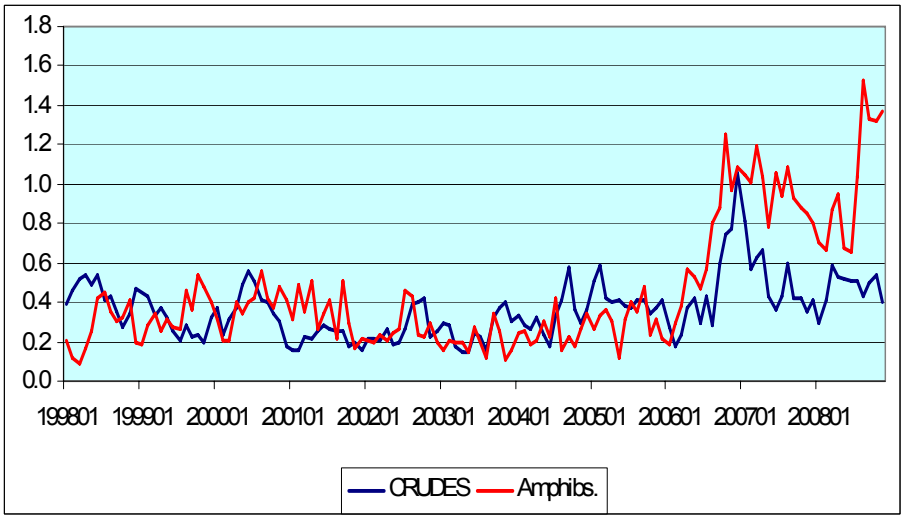
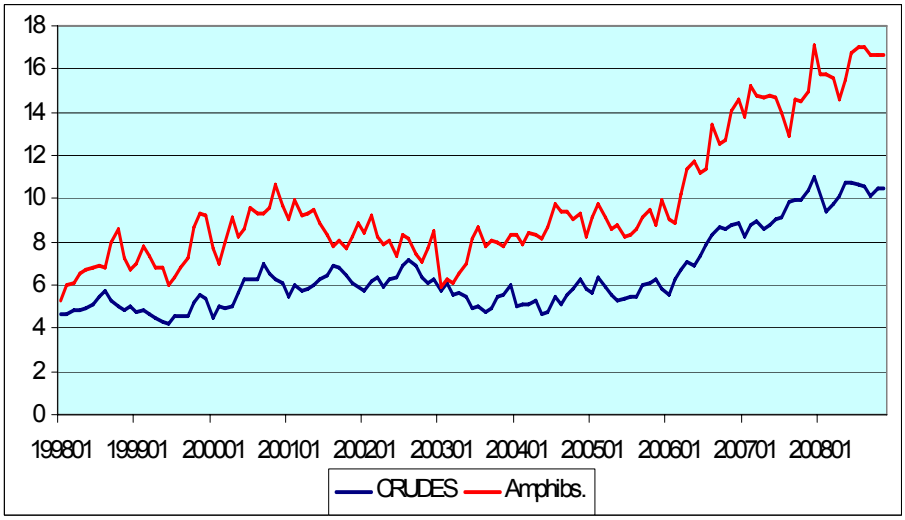


Figure 42. Open C3 & C4 CASREPs per ship



Figures 41 and 42 show the same trend—stable from 1998 to 2006, with a large increase since 2006, especially for amphibious ships. These data are consistent with the SURFOR contention that a decrease in resources is having a negative impact on ship readiness.

Summary and conclusions

Review

This report has investigated changes in the Surface Navy during this decade. We have documented and analyzed a variety of ship manpower and support infrastructure initiatives, all of which have contributed to a decline in Surface Navy resources:

- Substantial surface ship manning reductions in the past 7 years
  - Largest reductions for DDGs (23 percent less than 2002 manning)
  - Mostly in lower paygrades
  - NEC manning unchanged by optimal manning—at 65 to 70 percent, though there have been increases in the last 18 months
  - Top 6 Roll Down has lowered seniority aboard ships, especially amphibious ships
  - PAPA detachment timeliness has been poor
  - Individual augmentees have grown substantially in the past 5 years and are currently about 1 percent of enlisted manning
- Numerous changes to the training and support infrastructure
  - The Revolution in Training has brought many changes to Navy training, but there is no evidence of an adverse impact from schoolhouse computer-based training.
  - Afloat training may be adversely affected by access to computers/internet, and availability of OJT supervisors.

— The SIMA/RMC manning drawdown has led to less opportunity for in-rating shore duty for maintenance ratings.

— There has been a gradual decline in ATG manning, with ATG staff feeling they have less ability to respond to tasking.

At the same time, there has been a decline in a variety of ship readiness metrics:

- The organizational workload has increased.
- The CSMP backlog has increased, mostly in ship's force low-priority tasks.
- INSURV results have shown worrisome indicators.
- CASREPS have increased.
- Air defense exercise metrics have declined.

Cause and effect

It's difficult to prove cause-and-effect relationships in an environment where so many events are occurring.

There are significant indications of cause and effect. For example, the decline in CRUDES (CG/DDG/FFG) manning is highly correlated with the increase in open C2 CASREPs.[2]

However, manning declined at the same time as other resources and infrastructure reductions. Hence, more detailed analysis, considering the effect of all initiatives, is needed to isolate effects of individual initiatives.

Overall, there is some evidence that the cumulative effect of the resource reductions has been a decline in ship readiness. These trends should be monitored and further analyzed.

2. Correlation of -0.87 on nine observations.

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List of figures

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